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Review Article

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“ASPIN BUBBLES” and The Nuclear Forces

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ABSTRACT

The atomic nucleus is a cluster of nucleons, protons and neutrons. The presence of positive charges at very small distances, on the order of 1 Fermi, demonstrates the existence of much stronger attractive nuclear forces, 100 times stronger than the repulsive forces between protons. Furthermore, a nuclear force much stronger than gravity must exist between neutrons for the nuclei to be stable.

In this article, we will see how Aspin Bubbles achieves the creation of mechanical nuclear forces that stabilize nuclei. We will also begin explor-ing the possible structural design of the first atomic nuclei.

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1. - Introduction to Aspin Bubbles

Aspin Bubbles considers that all physical phenomena existing in our Universe can be explained mechanically. The theory is based on the hypothesis that the primary components of the matter are exclusively two pulsating particles (tones) that generate spherical waves in an elas-tic medium that fills the entire universe. The mechanical interaction between these particles and their waves reproduces all the forces of nature.

The mechanical wave-particle interaction leads us to the understand-ing and obtaining of the electrical forces, and considering that these forces have a small, as yet unobserved, asymmetry in value, the force of gravity is obtained.

The theory is published by LAP LAMBERT Academic Publishing under the title: The mechanics of “Aspin Bubbles”, the origin of all known forces [1]

2. - Data Entry

We’ll perform the entire calculation with at least 70 significant decimals. This is essential to verify that Aspin Bubbles obtains all the forces. All calculations are performed using WOLFRAM’s MATHEMAT-ICA 4 program.

significant decimal places

```
In[ ]:= digits = 70;

In[ ]:= ξ = N[1, digits]
          valor numérico
Out[ ]=
1.000000000000000000000000000000000000000000000000000000000000000000000

In[ ]:= π * ξ
Out[ ]=
3.141592653589793238462643383279502884197169399375105820974944592307816
```

Planck constant in J/Hz (CODATA 2022)

In[∘]:= $h = \frac{662\,607\,015}{100\,000\,000} * 10^{-34} * \xi$

Out[∘]=

6.626070150000000000000000000000000000000000000000000000000000000000000 × 10^{-34}

reduced Planck constant in J·s (CODATA 2022)

In[∘]:= $\hbar = \frac{h}{2 * \pi}$

Out[∘]=

1.054571817646156391262428003302280744722826330020413122421923470598436 × 10^{-34}

speed of light in vacuum in m/s (CODATA 2022)

In[∘]:= $vc = \frac{299\,792\,458}{100\,000\,000} * 10^{8} * \xi$

Out[∘]=

2.997924580000000000000000000000000000000000000000000000000000000000000 × 10^{8}

Newtonian constant of gravitation in $m^3/\text{kg}\cdot s^2$ (CODATA 2022)

In[∘]:= $G = \frac{667\,430}{100\,000} * 10^{-11} * \xi$

Out[∘]=

6.674300000000000000000000000000000000000000000000000000000000000000000 × 10^{-11}

Coulomb constant in $\text{N}\cdot m^2/C^2$ (CODATA 2022)

In[∘]:= $k = vc^2 * 10^{-7}$

Out[∘]=

8.98755178736817640000000000000000000000000000000000000000000000000000 × 10^{9}

electric charge of the electron in C (CODATA 2022)

In[∘]:= $e = \frac{1\,602\,176\,634}{1\,000\,000\,000} * 10^{-19} * \xi$

Out[∘]=

1.602176634000000000000000000000000000000000000000000000000000000000000 × 10^{-19}

large distance **s** = 1 *m* between two particles

In[∘]:= $s = \frac{10\,000}{10\,000} * \xi$

Out[∘]=

1.0000000000000000000000000000000000000000000000000000000000000000000000

Electric force in N between two charges **e** separated by a distance **s**

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In[∘]:= $F_E = \frac{k * e^2}{s^2}$

Out[∘]=

$2.30707755108571897182984979903482384000000000000000000000000000000000 \times 10^{-28}$

Factor **Λ**, ratio between the mass **m** of a ton and its passive mass **M**

In[∘]:= $\Lambda = \frac{\pi^2}{8} * \varsigma$

Out[∘]=

1.233700550136169827354311374984518891914212425905098828301668672027506

Mass of the electron in kg (CODATA 2022)

In[∘]:= $m_o = \frac{91\,093\,837\,139}{10\,000\,000\,000} * 10^{-31} * \varsigma$

Out[∘]=

$9.109383713900000000000000000000000000000000000000000000000000000000000 \times 10^{-31}$

In[∘]:= $mo = m_o$

Out[∘]=

$9.109383713900000000000000000000000000000000000000000000000000000000000 \times 10^{-31}$

Mass of the proton in kg (CODATA 2022)

In[∘]:= $m_p = \frac{167\,262\,192\,595}{100\,000\,000\,000} * 10^{-27} * \varsigma$

Out[∘]=

$1.672621925950000000000000000000000000000000000000000000000000000000000 \times 10^{-27}$

In[∘]:= $mp = m_p$

Out[∘]=

$1.672621925950000000000000000000000000000000000000000000000000000000000 \times 10^{-27}$

Mass of the neutron in kg (CODATA 2022)

In[∘]:= $m_n = \frac{100\,137\,841\,946}{100\,000\,000\,000} * mp$

Out[∘]=

$1.674927500561952158987000000000000000000000000000000000000000000000000 \times 10^{-27}$

In[∘]:= $mn = m_n$

Out[∘]=

$1.674927500561952158987000000000000000000000000000000000000000000000000 \times 10^{-27}$

3.- The proton

We consider a possible configuration of the proton to be the mechanical

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union of three tons of equal mass: two positons attached to a central negaton. See: the proton in "Aspin Bubbles", version 5 [2]

mass of the tons A, B, C, of the proton

Info: (τ_i = excited energy and δ_i)

POSITONS A, C,

In[∘]:= $m_A = \frac{mp}{3} * \xi;$ $\tau_A = 1 * \xi;$ $\delta_A = 1 * \xi;$

In[∘]:= $m_C = \frac{mp}{3} * \xi;$ $\tau_C = 1 * \xi;$ $\delta_C = 1 * \xi;$

NEGATON B

In[∘]:= $m_B = \frac{mp}{3} * \xi;$ $\tau_B = 1 * \xi;$ $\delta_B = -1 * \xi;$

In[∘]:= m_A

Out[∘]=

$5.5754064198333333333333333333333333333333333333333333333333333333333 \times 10^{-28}$

In[∘]:= m_B

Out[∘]=

$5.5754064198333333333333333333333333333333333333333333333333333333333 \times 10^{-28}$

In[∘]:= m_C

Out[∘]=

$5.5754064198333333333333333333333333333333333333333333333333333333333 \times 10^{-28}$

Proton mass check.

In[∘]:= $\frac{m_A + m_B + m_C}{mp}$

Out[∘]=

1.000000000000000000000000000000000000000000000000000000000000000000000

4.- The neutron

We consider a possible configuration of the neutron to be the mechanical union of for tons: two positons a, c, attached to two negatons b, d.

mass of the tons a, b, c, d, of the neutron

POSITONS a, c,

In[∘]:= $m_a = \frac{mn}{3} * \zeta;$ $\tau_a = 1 * \zeta;$ $\delta_a = 1 * \zeta;$

In[∘]:= $m_c = \frac{mn}{3} * \zeta;$ $\tau_c = 1 * \zeta;$ $\delta_c = 1 * \zeta;$

NEGATONS b, d,

In[∘]:= $m_b = \frac{mn}{6} * \zeta;$ $\tau_b = 1 * \zeta;$ $\delta_b = -1 * \zeta;$

In[∘]:= $m_d = \frac{mn}{6} * \zeta;$ $\tau_d = 1 * \zeta;$ $\delta_d = -1 * \zeta;$

In[∘]:= m_a

Out[∘]=

$5.58309166853984052995666666666666666666666666666666666666666666666667 \times 10^{-28}$

In[∘]:= m_b

Out[∘]=

$2.7915458342699202649783333333333333333333333333333333333333333333333333 \times 10^{-28}$

In[∘]:= m_c

Out[∘]=

$5.58309166853984052995666666666666666666666666666666666666666666666667 \times 10^{-28}$

In[∘]:= m_d

Out[∘]=

$2.7915458342699202649783333333333333333333333333333333333333333333333333 \times 10^{-28}$

Neutron mass check.

In[∘]:= $\frac{m_a + m_b + m_c + m_d}{mn}$

Out[∘]=

1.0000000000000000000000000000000000000000000000000000000000000000000000

5.- Aspin factors of the tons

5.1 - Aspin factors of the tons of the proton:

In[∘]:= $HA = \frac{G * m_A^2}{k * e^2}$

Out[∘]=

$8.99283431431762269138282099132061463612477682060686656775796525223778 \times 10^{-38}$

In[∘]:= $Aspin_A = \sqrt{1 + HA} + \delta_A * \sqrt{HA}$

Out[∘]=

1.000000000000000000299880548124042595329339943201034888951485823264199388841515183391783

In[∘]:= $HB = \frac{G * m_B^2}{k * e^2}$

Out[∘]=

$8.9928343143176226913828209913206146361247768206068665677579652522377 8 \times 10^{-38}$

In[∘]:= $Aspin_B = \sqrt{1 + HB} + \delta_B * \sqrt{HB}$

Out[∘]=

0.999999999999999999700119451875957404760588399942141337962342386649006757517710808089 1669

In[∘]:= $HC = \frac{G * m_C^2}{k * e^2}$

Out[∘]=

$8.9928343143176226913828209913206146361247768206068665677579652522377 8 \times 10^{-38}$

In[∘]:= $Aspin_C = \sqrt{1 + HC} + \delta_C * \sqrt{HC}$

Out[∘]=

1.000000000000000000299880548124042595329339943201034888951485823264199388841515183391783

5.2 - Aspin factors of the tons of the neutron:

In[∘]:= $Ha = \frac{G * m_a^2}{k * e^2}$

Out[∘]=

$9.0176431967032234747796527037848808511497827030241276766401572497884 9 \times 10^{-38}$

In[∘]:= $Aspin_a = \sqrt{1 + Ha} + \delta_a * \sqrt{Ha}$

Out[∘]=

1.000000000000000000300293909307252242136672875410529438212845950607401548943967296312215

In[∘]:= $Hb = \frac{G * m_b^2}{k * e^2}$

Out[∘]=

$2.2544107991758058686949131759462202127874456757560319191600393124471 2 \times 10^{-38}$

In[∘]:= $Aspin_b = \sqrt{1 + Hb} + \delta_b * \sqrt{Hb}$

Out[∘]=

0.9999999999999999998498530453463738789654797242823723689240007223354925287192562705 7444568

In[∘]:= $$Hc = \frac{G * m_c^2}{k * e^2}$$

Out[∘]=

9.01764319670322347477965270378488085114978270302412767664015724978849 × 10^{-38}

In[∘]:= $$Aspin_c = \sqrt{1 + Hc} + \delta_c * \sqrt{Hc}$$

Out[∘]=

1.000000000000000003002939093072522421366728754105294382128459506074015489439672963
12215

In[∘]:= $$Hd = \frac{G * m_d^2}{k * e^2}$$

Out[∘]=

2.25441079917580586869491317594622021278744567575603191916003931244712 × 10^{-38}

In[∘]:= $$Aspin_d = \sqrt{1 + Hd} + \delta_d * \sqrt{Hd}$$

Out[∘]=

0.9999999999999999998498530453463738789654797242823723689240007223354925287192562705
7444568

6.- Position of equilibrium radius (R_{i1} in *m*) and total average acceleration (a_i in m/s^2) of the surface of the tons *i* (see equations 47 and 40 of [1]):

Proton (ABC), tons A, B, C,

Positon A

Position of equilibrium radius

In[∘]:= $$R_{A1} = \frac{\hbar}{m_A * vc} * \sqrt{\frac{\Lambda}{2 * \tau_A}} * Aspin_A$$

Out[∘]=

4.95528695101455967984179007921557548169725467385611471239598243223249 × 10^{-16}

Total average acceleration

In[∘]:= $$a_A = \frac{k * e^2}{\delta_A * m_A * R_{A1}^2}$$

Out[∘]=

1.68518678626059025817051728951601808898388446773138259038215272828053 × 10^{30}

Negaton B

In[∘]:= $$R_{B1} = \frac{\hbar}{m_B * vc} * \sqrt{\frac{\Lambda}{2 * \tau_B}} * Aspin_B$$

Out[∘]=

$$4.9552869510145596768698017452512515494838802083312582306613862444603 1 \times 10^{-16}$$

In[∘]:= $$a_B = \frac{k * e^2}{\delta_B * m_B * R_{B1}{}^2}$$

Out[∘]=

$$-1.6851867862605902601919362381368965699175987393782205681508008044467 1 \times 10^{30}$$

Positon C

In[∘]:= $$R_{C1} = \frac{\hbar}{m_C * vc} * \sqrt{\frac{\Lambda}{2 * \tau_C}} * Aspin_C$$

Out[∘]=

$$4.9552869510145596798417900792155754816972546738561147123959824322324 9 \times 10^{-16}$$

In[∘]:= $$a_C = \frac{k * e^2}{\delta_C * m_C * R_{C1}{}^2}$$

Out[∘]=

$$1.6851867862605902581705172895160180889838844677313825903821527282805 3 \times 10^{30}$$

Neutron (abcd), tons a, b, c, d,

Positon a

In[∘]:= $$R_{a1} = \frac{\hbar}{m_a * vc} * \sqrt{\frac{\Lambda}{2 * \tau_a}} * Aspin_a$$

Out[∘]=

$$4.9484658893355533466409603770759397699481382307016919240450669148388 1 \times 10^{-16}$$

In[∘]:= $$a_a = \frac{k * e^2}{\delta_a * m_a * R_{a1}{}^2}$$

Out[∘]=

$$1.6875096805205067164120708525497180428420297817575957887657811851815 9 \times 10^{30}$$

Negaton b

In[∘]:= $$R_{b1} = \frac{\hbar}{m_b * vc} * \sqrt{\frac{\Lambda}{2 * \tau_b}} * Aspin_b$$

Out[∘]=

$$9.8969317786711066888239382532053936412415385149079637332780481520541 3 \times 10^{-16}$$

In[ ]:= $a_b = \frac{k * e^2}{\delta_b * m_b * {R_{b1}}^2}$

Out[ ]=

$-8.4375484026025335896615874471086189589837743424348550337185101027902 \times 10^{29}$

Positon c

In[ ]:= $R_{c1} = \frac{\hbar}{m_c * vc} * \sqrt{\frac{\Lambda}{2 * \tau_c}} * Aspin_c$

Out[ ]=

$4.94846588933555334664096037707593976994813823070169192404506691483881 \times 10^{-16}$

In[ ]:= $a_c = \frac{k * e^2}{\delta_c * m_c * {R_{c1}}^2}$

Out[ ]=

$1.68750968052050671641207085254971804284202978175759578876578118518159 \times 10^{30}$

Negaton d

In[ ]:= $R_{d1} = \frac{\hbar}{m_d * vc} * \sqrt{\frac{\Lambda}{2 * \tau_d}} * Aspin_d$

Out[ ]=

$9.89693177867110668882393825320539364124153851490796373327804815205413 \times 10^{-16}$

In[ ]:= $a_d = \frac{k * e^2}{\delta_d * m_d * {R_{d1}}^2}$

Out[ ]=

$-8.4375484026025335896615874471086189589837743424348550337185101027902 \times 10^{29}$

7.- The self-propulsion forces fij among tons separated s=1 m

---

7.1 - Forces fij between the tons of two protons

Repulsive force (in N) that the positon **A** exercises over the other positon **A**

In[ ]:= $f_{AA} = \delta_A * \sqrt{\frac{\tau_A}{\tau_A}} * m_A * a_A * \frac{R_{A1} * R_{A1}}{s^2}$

Out[ ]=

$2.30707755108571897182984979903482384000000000000000000000000000000000 \times 10^{-28}$

In[∘]:= $f_{AA} \Big/ \left(\delta_A * \delta_A * \frac{Aspin_A}{Aspin_A} * F_E\right)$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $f_{AA} = \delta_A * \delta_A * \frac{Aspin_A}{Aspin_A} * F_E$

Out[∘]=

$2.30707755108571897182984979903482384000000000000000000000000000000000 \times 10^{-28}$

In[∘]:= f_{AA} / F_E

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

Attractive force (in N) that the positon **A** exercises over the negaton **B**

In[∘]:= $f_{AB} = \delta_A * \sqrt{\frac{\tau_A}{\tau_B}} * m_A * a_B * \frac{R_{A1} * R_{B1}}{s^2}$

Out[∘]=

$-2.30707755108571897321354516020334241482559637933938054779782093536047 \times 10^{-28}$

In[∘]:= $f_{AB} \Big/ \left(\delta_A * \delta_B * \frac{Aspin_A}{Aspin_B} * F_E\right)$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $f_{AB} / -F_E$

Out[∘]=

1.00000000000000000059976109624808519074860822954524600484376761727527

Repulsive force (in N) that the positon **A** exercises over the positon **C**

In[∘]:= $f_{AC} = \delta_A * \sqrt{\frac{\tau_A}{\tau_C}} * m_A * a_C * \frac{R_{A1} * R_{C1}}{s^2}$

Out[∘]=

$2.30707755108571897182984979903482384000000000000000000000000000000000 \times 10^{-28}$

In[∘]:= $f_{AC} \Big/ \left(\delta_A * \delta_C * \frac{Aspin_A}{Aspin_C} * F_E\right)$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= f_{AC} / F_E

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

Attractive force (in N) that the negaton **B** exercises over the positon **A**

In[∘]:= $f_{BA} = \delta_B * \sqrt{\frac{\tau_B}{\tau_A}} * m_B * a_A * \frac{R_{B1} * R_{A1}}{s^2}$

Out[∘]=

$-2.3070775510857189704461544378663052660042902673484403204516593201950 9 \times 10^{-28}$

In[∘]:= $f_{BA} \Big/ \left(\delta_B * \delta_A * \frac{Aspin_B}{Aspin_A} * F_E\right)$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $f_{BA} / -F_E$

Out[∘]=

0.9999999999999999994002389037519148096111051430274589028115452223775 57

Repulsive force (in N) that the negaton **B** exercises over the other negaton **B**

In[∘]:= $f_{BB} = \delta_B * \sqrt{\frac{\tau_B}{\tau_B}} * m_B * a_B * \frac{R_{B1} * R_{B1}}{s^2}$

Out[∘]=

$2.30707755108571897182984979903482384000000000000000000000000000000000 \times 10^{-28}$

In[∘]:= $f_{BB} \Big/ \left(\delta_B * \delta_B * \frac{Aspin_B}{Aspin_B} * F_E\right)$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= f_{BB} / F_E

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000000

Attractive force (in N) that the negaton **B** exercises over the positon ***C***

In[∘]:= $f_{BC} = \delta_B * \sqrt{\frac{\tau_B}{\tau_C}} * m_B * a_C * \frac{R_{B1} * R_{C1}}{s^2}$

Out[∘]=

$-2.3070775510857189704461544378663052660042902673484403204516593201950 9 \times 10^{-28}$

In[∘]:= $f_{BC} = \delta_B * \delta_C * \frac{Aspin_B}{Aspin_C} * F_E$

Out[∘]=

$-2.3070775510857189704461544378663052660042902673484403204516593201950 9 \times 10^{-28}$

In[∘]:= $f_{BC} \Big/ -\left(\delta_B * \delta_C * \frac{Aspin_B}{Aspin_C} * F_E\right)$

Out[∘]=

-1.00000000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $f_{BC} / -F_E$

Out[∘]=

0.9999999999999999994002389037519148096111051430274589028115452223775 57

Repulsive force (in N) that the positon ***C*** exercises over the positon **A**

In[∘]:= $$f_{CA} = \delta_C * \sqrt{\frac{\tau_C}{\tau_A}} * m_C * a_A * \frac{R_{C1} * R_{A1}}{s^2}$$

Out[∘]=

$2.30707755108571897182984979903482384000000000000000000000000000000000 \times 10^{-28}$

In[∘]:= $$f_{CA} \Big/ \left(\delta_C * \delta_A * \frac{Aspin_C}{Aspin_A} * F_E\right)$$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= f_{CA} / F_E

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

Attractive force (in N) that the positon ***C*** exercises over the negaton **B**

In[∘]:= $$f_{CB} = \delta_C * \sqrt{\frac{\tau_C}{\tau_B}} * m_C * a_B * \frac{R_{C1} * R_{B1}}{s^2}$$

Out[∘]=

$-2.30707755108571897321354516020334241482559637933938054779782093536047 \times 10^{-28}$

In[∘]:= $$f_{CB} \Big/ \left(\delta_C * \delta_B * \frac{Aspin_C}{Aspin_B} * F_E\right)$$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $f_{CB} / -F_E$

Out[∘]=

1.00000000000000000059976109624808519074860822954524600484376761727527

Repulsive force (in N) that the positon ***C*** exercises over the other positon ***C***

In[∘]:= $$f_{CC} = \delta_C * \sqrt{\frac{\tau_C}{\tau_C}} * m_C * a_C * \frac{R_{C1} * R_{C1}}{s^2}$$

Out[∘]=

$2.30707755108571897182984979903482384000000000000000000000000000000000 \times 10^{-28}$

In[∘]:= $$f_{CC} \Big/ \left(\delta_C * \delta_C * \frac{Aspin_C}{Aspin_C} * F_E\right)$$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= f_{CC} / F_E

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

7.2 - Forces fij between the tons of two neutrons

Repulsive force (in N) that the positon **a** exercises over the other positon **a**

In[∘]:= $f_{aa} = \delta_a * \frac{m_a * a_a * R_{a1}{}^2}{s^2}$

Out[∘]=

$2.307077551085718971829849799034823840000000000000000000000000000000 \times 10^{-28}$

In[∘]:= f_{aa} / F_E

Out[∘]=

1.000000000000000000000000000000000000000000000000000000000000000000

Attractive force (in N) that the positon **a** exercises over the negaton **b**

In[∘]:= $f_{ab} = \delta_a * \sqrt{\frac{\tau_a}{\tau_b}} * m_a * a_b * \frac{R_{a1} * R_{b1}}{s^2}$

Out[∘]=

$-2.307077551085718972869051804370622581798793643206039310389352827588 90 \times 10^{-28}$

In[∘]:= $f_{ab} \Big/ \left(\delta_a * \delta_b \frac{Aspin_a}{Aspin_b} * F_E\right)$

Out[∘]=

1.000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $f_{ab} / -F_E$

Out[∘]=

1.000000000000000000450440863960878363238825475103431245359847411031 33

Repulsive force (in N) that the positon **a** exercises over the positon **c**

In[∘]:= $f_{ac} = \delta_a * \sqrt{\frac{\tau_a}{\tau_c}} * m_a * a_c * \frac{R_{a1} * R_{c1}}{s^2}$

Out[∘]=

$2.307077551085718971829849799034823840000000000000000000000000000000 \times 10^{-28}$

In[∘]:= $f_{ac} \Big/ \left(\delta_a * \delta_c \frac{Aspin_a}{Aspin_c} * F_E\right)$

Out[∘]=

1.000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $f_{ac} / -F_E$

Out[∘]=

-1.000000000000000000000000000000000000000000000000000000000000000000

Attractive force (in N) that the positon **a** exercises over the negaton **d**

In[∘]:= $f_{ad} = \delta_a * \sqrt{\frac{\tau_a}{\tau_d}} * m_a * a_d * \frac{R_{a1} * R_{d1}}{s^2}$

Out[∘]=

$-2.307077551085718972869051804370622581798793643206039310389352827588 90 \times 10^{-28}$

In[∘]:= $f_{ad} \Big/ \left(\delta_a * \delta_d \frac{Aspin_a}{Aspin_d} * F_E \right)$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $f_{ad} / - F_E$

Out[∘]=

1.00000000000000000045044086396087836323882547510343124535984741103133

Attractive force (in N) that the negaton **b** exercises over the positon **a**

In[∘]:= $f_{ba} = \delta_b * \sqrt{\frac{\tau_b}{\tau_a}} * m_b * a_a * \frac{R_{b1} * R_{a1}}{s^2}$

Out[∘]=

$-2.30707755108571897079064779369902509866930540590729520141152648628371 \times 10^{-28}$

In[∘]:= $f_{ba} \Big/ \left(\delta_b * \delta_a * \frac{Aspin_b}{Aspin_a} * F_E \right)$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $f_{ba} / - F_E$

Out[∘]=

0.999999999999999999954955913603912163696407149682239128282269474803829

Repulsive force (in N) that the negaton **b** exercises over the other negaton **b**

In[∘]:= $f_{bb} = \delta_b * \frac{m_b * a_b * R_{b1}{}^2}{s^2}$

Out[∘]=

$2.30707755108571897182984979903482384000000000000000000000000000000000 \times 10^{-28}$

In[∘]:= f_{bb} / F_E

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

Attractive force (in N) that the negaton **b** exercises over the positon **c**

In[∘]:= $f_{bc} = \delta_b * \sqrt{\frac{\tau_b}{\tau_c}} * m_b * a_c * \frac{R_{b1} * R_{c1}}{s^2}$

Out[∘]=

$-2.30707755108571897079064779369902509866930540590729520141152648628371 \times 10^{-28}$

In[∘]:= $f_{bc} \Big/ \left(\delta_b * \delta_c * \frac{Aspin_b}{Aspin_c} * F_E \right)$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $f_{bc} / -F_E$

Out[∘]=

0.999999999999999999549559136039121636964071496822391282822694774803829

Repulsive force (in N) that the negaton **b** exercises over the negaton **d**

In[∘]:= $f_{bd} = \delta_b * \sqrt{\frac{\tau_b}{\tau_d}} * m_b * a_d * \frac{R_{b1} * R_{d1}}{s^2}$

Out[∘]=

$2.30707755108571897182984979903482384000000000000000000000000000000000 \times 10^{-28}$

In[∘]:= $f_{bd} \Big/ \left(\delta_b * \delta_d * \frac{Aspin_b}{Aspin_d} * F_E\right)$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $f_{bd} / -F_E$

Out[∘]=

-1.00000000000000000000000000000000000000000000000000000000000000000000

Repulsive force (in N) that the positon **c** exercises over the positon **a**

In[∘]:= $f_{ca} = \delta_c * \sqrt{\frac{\tau_c}{\tau_a}} * m_c * a_a * \frac{R_{c1} * R_{a1}}{s^2}$

Out[∘]=

$2.30707755108571897182984979903482384000000000000000000000000000000000 \times 10^{-28}$

In[∘]:= $f_{ca} \Big/ \left(\delta_c * \delta_a * \frac{Aspin_c}{Aspin_a} * F_E\right)$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= f_{ca} / F_E

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

Attractive force (in N) that the positon **c** exercises over the negaton **b**

In[∘]:= $f_{cb} = \delta_c * \sqrt{\frac{\tau_c}{\tau_b}} * m_c * a_b * \frac{R_{c1} * R_{b1}}{s^2}$

Out[∘]=

$-2.30707755108571897286905180437062258179879364320603931038935282758890 \times 10^{-28}$

In[∘]:= $f_{cb} \Big/ \left(\delta_c * \delta_b * \frac{Aspin_c}{Aspin_b} * F_E\right)$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $f_{cb} / -F_E$

Out[∘]=

1.00000000000000000045044086396087836323882547510343124535984741103133

Repulsive force (in N) that the positon **c** exercises over the other positon **c**

In[∘]:= $$f_{cc} = \delta_c * \sqrt{\frac{\tau_c}{\tau_c}} * m_c * a_c * \frac{R_{c1} * R_{c1}}{s^2}$$

Out[∘]=

$2.30707755108571897182984979903482384000000000000000000000000000000000 \times 10^{-28}$

In[∘]:= $$f_{cc} \Big/ \left(\delta_c * \delta_c * \frac{Aspin_c}{Aspin_c} * F_E\right)$$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= f_{cc} / F_E

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

Attractive force (in N) that the positon **c** exercises over the negaton **d**

In[∘]:= $$f_{cd} = \delta_c * \sqrt{\frac{\tau_c}{\tau_d}} * m_c * a_d * \frac{R_{c1} * R_{d1}}{s^2}$$

Out[∘]=

$-2.30707755108571897286905180437062258179879364320603931038935282758890 \times 10^{-28}$

In[∘]:= $$f_{cd} \Big/ \left(\delta_c * \delta_d * \frac{Aspin_c}{Aspin_d} * F_E\right)$$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $f_{cd} / -F_E$

Out[∘]=

1.00000000000000000045044086396087836323882547510343124535984741103133

Attractive force (in N) that the negaton **d** exercises over the positon **a**

In[∘]:= $$f_{da} = \delta_d * \sqrt{\frac{\tau_d}{\tau_a}} * m_d * a_a * \frac{R_{d1} * R_{a1}}{s^2}$$

Out[∘]=

$-2.30707755108571897079064779369902509866930540590729520141152648628371 \times 10^{-28}$

In[∘]:= $$f_{da} \Big/ \left(\delta_d * \delta_a * \frac{Aspin_d}{Aspin_a} * F_E\right)$$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $f_{da} = \delta_d * \delta_a * \frac{Aspin_d}{Aspin_a} * F_E$

Out[∘]=

$-2.30707755108571897079064779369902509866930540590729520141152648628371 \times 10^{-28}$

In[∘]:= f_{da} / F_E

Out[∘]=

$-0.999999999999999999549559136039121636964071496822391282822694774803829$

Repulsive force (in N) that the negaton **d** exercises over the negaton **b**

In[∘]:= $f_{db} = \delta_d * \sqrt{\frac{\tau_d}{\tau_b}} * m_d * a_b * \frac{R_{d1} * R_{b1}}{s^2}$

Out[∘]=

$2.30707755108571897182984979903482384000000000000000000000000000000000 \times 10^{-28}$

In[∘]:= $f_{db} \Big/ \left(\delta_d * \delta_b * \frac{Aspin_d}{Aspin_b} * F_E\right)$

Out[∘]=

$1.00000000000000000000000000000000000000000000000000000000000000000000$

In[∘]:= $f_{db} / -F_E$

Out[∘]=

$-1.00000000000000000000000000000000000000000000000000000000000000000000$

Attractive force (in N) that the negaton **d** exercises over the positon **c**

In[∘]:= $f_{dc} = \delta_d * \sqrt{\frac{\tau_d}{\tau_c}} * m_d * a_c * \frac{R_{d1} * R_{c1}}{s^2}$

Out[∘]=

$-2.30707755108571897079064779369902509866930540590729520141152648628371 \times 10^{-28}$

In[∘]:= $f_{dc} \Big/ \left(\delta_d * \delta_c * \frac{Aspin_d}{Aspin_c} * F_E\right)$

Out[∘]=

$1.00000000000000000000000000000000000000000000000000000000000000000000$

In[∘]:= f_{dc} / F_E

Out[∘]=

$-0.999999999999999999549559136039121636964071496822391282822694774803829$

Repulsive force (in N) that the negaton **d** exercises over the other negaton **d**

In[∘]:= $f_{dd} = \delta_d * \sqrt{\frac{\tau_d}{\tau_d}} * m_d * a_d * \frac{R_{d1} * R_{d1}}{s^2}$

Out[∘]=

$2.30707755108571897182984979903482384000000000000000000000000000000000 \times 10^{-28}$

In[∘]:= $f_{dd} \Big/ \left(\delta_d * \delta_d * \frac{Aspin_d}{Aspin_d} * F_E\right)$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $f_{dd} / -F_E$

Out[∘]=

-1.00000000000000000000000000000000000000000000000000000000000000000000

7.3 - Forces fij among the tons of the proton and the neutron

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Repulsive force (in N) that the positon **A** exercises over the positon **a**

In[∘]:= $f_{Aa} = \delta_A * \sqrt{\frac{\tau_A}{\tau_a}} * m_A * a_a * \frac{R_{A1} * R_{a1}}{s^2}$

Out[∘]=

$2.3070775510857189718288961427285506328288306460004032553789367 5827115 \times 10^{-28}$

In[∘]:= $f_{Aa} \Big/ \left(\delta_A * \delta_a * \frac{Aspin_A}{Aspin_a} * F_E\right)$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $f_{Aa} / -F_E$

Out[∘]=

-0.99999999999999999999958663881679035319279119763616734689523940529 6877

Attractive force (in N) that the positon **A** exercises over the negaton **b**

In[∘]:= $f_{Ab} = \delta_A * \sqrt{\frac{\tau_A}{\tau_b}} * m_A * a_b * \frac{R_{A1} * R_{b1}}{s^2}$

Out[∘]=

$-2.3070775510857189728680981480643493746271947234359231223056660 8996749 \times 10^{-28}$

In[∘]:= $f_{Ab} \Big/ \left(\delta_A * \delta_b * \frac{Aspin_A}{Aspin_b} * F_E\right)$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $f_{Ab} / -F_E$

Out[∘]=

1.0000000000000000004500275027776687164314304779711057480201735390 7936

Repulsive force (in N) that the positon **A** exercises over the positon **c**

In[∘]:= $f_{Ac} = \delta_A * \sqrt{\frac{\tau_A}{\tau_c}} * m_A * a_c * \frac{R_{A1} * R_{c1}}{s^2}$

Out[∘]=

$2.30707755108571897182889614272855063282883064600040325537893675827115 \times 10^{-28}$

In[∘]:= $f_{Ac} \Big/ \left(\delta_A * \delta_c * \frac{Aspin_A}{Aspin_c} * F_E\right)$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= f_{Ac} / F_E

Out[∘]=

0.999999999999999999999586638816790353192791197636167346895239405296877

Attractive force (in N) that the positon **A** exercises over the negaton **d**

In[∘]:= $f_{Ad} = \delta_A * \sqrt{\frac{\tau_A}{\tau_d}} * m_A * a_d * \frac{R_{A1} * R_{d1}}{s^2}$

Out[∘]=

$-2.30707755108571897286809814806434937462719472343592312230566608996749 \times 10^{-28}$

In[∘]:= $f_{Ad} \Big/ \left(\delta_A * \delta_d * \frac{Aspin_A}{Aspin_d} * F_E\right)$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $f_{Ad} / -F_E$

Out[∘]=

1.00000000000000000045002750277766871643143047797110574802017353907936

Attractive force (in N) that the negaton **B** exercises over the positon **a**

In[∘]:= $f_{Ba} = \delta_B * \sqrt{\frac{\tau_B}{\tau_a}} * m_B * a_a * \frac{R_{B1} * R_{a1}}{s^2}$

Out[∘]=

$-2.30707755108571897044520078156003205883369287930053789424531902864845 \times 10^{-28}$

In[∘]:= $f_{Ba} \Big/ \left(\delta_B * \delta_a * \frac{Aspin_B}{Aspin_a} * F_E\right)$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $f_{Ba} = \delta_B * \delta_a * \frac{Aspin_B}{Aspin_a} * F_E$

Out[∘]=

$-2.30707755108571897044520078156003205883369287930053789424531902864845 \times 10^{-28}$

In[∘]:= $f_{Ba} / -F_E$

Out[∘]=

0.999999999999999999399825542568705162804144258620014473061485023757235

Repulsive force (in N) that the negaton **B** exercises over the negaton **b**

In[ ]:= $f_{Bb} = \delta_B * \sqrt{\frac{\tau_B}{\tau_b}} * m_B * a_b * \frac{R_{B1} * R_{b1}}{s^2}$

Out[ ]=

$2.30707755108571897148440278689583080000878402279265063240938755036358 \times 10^{-28}$

In[ ]:= $f_{Bb} \Big/ \left(\delta_B * \delta_b * \frac{Aspin_B}{Aspin_b} * F_E\right)$

Out[ ]=

$1.00000000000000000000000000000000000000000000000000000000000000000000$

In[ ]:= f_{Bb} / F_E

Out[ ]=

$0.999999999999999999850266406529583525772626632590841858433053956541782$

Attractive force (in N) that the negaton **B** exercises over the positon **c**

In[ ]:= $f_{Bc} = \delta_B * \sqrt{\frac{\tau_B}{\tau_c}} * m_B * a_c * \frac{R_{B1} * R_{c1}}{s^2}$

Out[ ]=

$-2.30707755108571897044520078156003205883369287930053789424531902864845 \times 10^{-28}$

In[ ]:= $f_{Bc} = \delta_B * \delta_c * \frac{Aspin_B}{Aspin_c} * F_E$

Out[ ]=

$-2.30707755108571897044520078156003205883369287930053789424531902864845 \times 10^{-28}$

In[ ]:= $f_{Bc} \Big/ -\left(\delta_B * \delta_c * \frac{Aspin_B}{Aspin_c} * F_E\right)$

Out[ ]=

$-1.00000000000000000000000000000000000000000000000000000000000000000000$

In[ ]:= $f_{Bc} / -F_E$

Out[ ]=

$0.999999999999999999399825542568705162804144258620014473061485023757235$

Repulsive force (in N) that the negaton **B** exercises over the negaton **d**

In[ ]:= $f_{Bd} = \delta_B * \sqrt{\frac{\tau_B}{\tau_d}} * m_B * a_d * \frac{R_{B1} * R_{d1}}{s^2}$

Out[ ]=

$2.30707755108571897148440278689583080000878402279265063240938755036358 \times 10^{-28}$

In[ ]:= $f_{Bd} \Big/ \left(\delta_B * \delta_d * \frac{Aspin_B}{Aspin_d} * F_E\right)$

Out[ ]=

$1.00000000000000000000000000000000000000000000000000000000000000000000$

In[∘]:= f_{Bd} / F_E

Out[∘]=

0.99999999999999999998502664065295835257726266325908418584330539565417 82

Repulsive force (in N) that the positon ***C*** exercises over the positon **a**

In[∘]:= $f_{Ca} = \delta_C * \sqrt{\frac{\tau_C}{\tau_a}} * m_C * a_a * \frac{R_{C1} * R_{a1}}{s^2}$

Out[∘]=

$2.30707755108571897182889614272855063282883064600040325537893675827115 \times 10^{-28}$

In[∘]:= $f_{Ca} \Big/ \left(\delta_C * \delta_a * \frac{Aspin_C}{Aspin_a} * F_E\right)$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= f_{Ca} / F_E

Out[∘]=

0.99999999999999999999995866388167903531927911976361673468952394052968 77

Attractive force (in N) that the positon ***C*** exercises over the negaton **b**

In[∘]:= $f_{Cb} = \delta_C * \sqrt{\frac{\tau_C}{\tau_b}} * m_C * a_b * \frac{R_{C1} * R_{b1}}{s^2}$

Out[∘]=

$-2.30707755108571897286809814806434937462719472343592312230566608996749 \times 10^{-28}$

In[∘]:= $f_{Cb} \Big/ \left(\delta_C * \delta_b * \frac{Aspin_C}{Aspin_b} * F_E\right)$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $f_{Cb} / -F_E$

Out[∘]=

1.00000000000000000045002750277766871643143047797110574802017353907936

Repulsive force (in N) that the positon ***C*** exercises over the positon **c**

In[∘]:= $f_{Cc} = \delta_C * \sqrt{\frac{\tau_C}{\tau_c}} * m_C * a_c * \frac{R_{C1} * R_{c1}}{s^2}$

Out[∘]=

$2.30707755108571897182889614272855063282883064600040325537893675827115 \times 10^{-28}$

In[∘]:= $f_{Cc} \Big/ \left(\delta_C * \delta_c * \frac{Aspin_C}{Aspin_c} * F_E\right)$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= f_{Cc} / F_E

Out[∘]=

0.99999999999999999999995866388167903531927911976361673468952394052968 77

Attractive force (in N) that the positon **C** exercises over the negaton **d**

In[∘]:= $$f_{Cd} = \delta_C * \sqrt{\frac{\tau_C}{\tau_d}} * m_C * a_d * \frac{R_{C1} * R_{d1}}{s^2}$$

Out[∘]=

$-2.307077551085718972868098148064349374627194723435923122305666089967 49 \times 10^{-28}$

In[∘]:= $$f_{Cd} \Big/ \left(\delta_C * \delta_d * \frac{Aspin_C}{Aspin_d} * F_E\right)$$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $f_{Cd} / -F_E$

Out[∘]=

1.00000000000000000045002750277766871643143047797110574802017353907936

7.4 - Forces fij among the tons of the neutron and the proton

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Repulsive force (in N) that the positon **a** exercises over the positon **A**

In[∘]:= $$f_{aA} = \delta_a * \sqrt{\frac{\tau_a}{\tau_A}} * m_a * a_A * \frac{R_{a1} * R_{A1}}{s^2}$$

Out[∘]=

$2.3070775510857189718308034553410970471711697482040958810553005052571 1 \times 10^{-28}$

In[∘]:= $$f_{aA} \Big/ \left(\delta_a * \delta_A * \frac{Aspin_a}{Aspin_A} * F_E\right)$$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $$f_{aA} = \delta_a * \delta_A * \frac{Aspin_a}{Aspin_A} * F_E$$

Out[∘]=

$2.3070775510857189718308034553410970471711697482040958810553005052571 1 \times 10^{-28}$

In[∘]:= f_{aA} / F_E

Out[∘]=

1.00000000000000000000041336118320964680720897323130043758395411873248

Attractive force (in N) that the positon **a** exercises over the negaton **B**

In[∘]:= $$f_{aB} = \delta_a * \sqrt{\frac{\tau_a}{\tau_B}} * m_a * a_B * \frac{R_{a1} * R_{B1}}{s^2}$$

Out[∘]=

$-2.3070775510857189732144988165096156219973380934951707472681876701545 1 \times 10^{-28}$

In[∘]:= $f_{aB} \Big/ \left(\delta_a * \delta_B * \frac{Aspin_a}{Aspin_B} * F_E\right)$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $f_{aB} = \delta_a * \delta_B * \frac{Aspin_a}{Aspin_B} * F_E$

Out[∘]=

$-2.30707755108571897321449881650961562199733809349517074726818767015451 \times 10^{-28}$

In[∘]:= $f_{aB} / -F_E$

Out[∘]=

1.00000000000000000060017445743129483755606512073293466578257092611551

Repulsive force (in N) that the positon **a** exercises over the positon ***C***

In[∘]:= $f_{aC} = \delta_a * \sqrt{\frac{\tau_a}{\tau_C}} * m_a * a_C * \frac{R_{a1} * R_{C1}}{s^2}$

Out[∘]=

$2.30707755108571897183080345534109704717116974820409588105530050525711 \times 10^{-28}$

In[∘]:= $f_{aC} \Big/ \left(\delta_a * \delta_C * \frac{Aspin_a}{Aspin_C} * F_E\right)$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= f_{aC} / F_E

Out[∘]=

1.00000000000000000000041336118320964680720897323130043758395411873248

Attractive force (in N) that the negaton **b** exercises over the positon **A**

In[∘]:= $f_{bA} = \delta_b * \sqrt{\frac{\tau_b}{\tau_A}} * m_b * a_A * \frac{R_{b1} * R_{A1}}{s^2}$

Out[∘]=

$-2.30707755108571897079160145000529830584004558834087163900439681205925 \times 10^{-28}$

In[∘]:= $f_{bA} \Big/ \left(\delta_b * \delta_A * \frac{Aspin_b}{Aspin_A} * F_E\right)$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $f_{bA} / -F_E$

Out[∘]=

0.999999999999999999549972497222331283771094275285198876171819409054158

Repulsive force (in N) that the negaton **b** exercises over the negaton **B**

In[∘]:= $f_{bB} = \delta_b * \sqrt{\frac{\tau_b}{\tau_B}} * m_b * a_B * \frac{R_{b1} * R_{B1}}{s^2}$

Out[∘]=

$2.30707755108571897217529681117381688004294099968853937636104063402581 \times 10^{-28}$

In[∘]:= $f_{bB} \Big/ \left(\delta_b * \delta_B * \frac{Aspin_b}{Aspin_B} * F_E\right)$

Out[∘]=

1.0000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= f_{bB} / F_E

Out[∘]=

1.0000000000000000014973359347041647424979351642272208857650777867004

Attractive force (in N) that the negaton **b** exercises over the positon ***C***

In[∘]:= $f_{bC} = \delta_b * \sqrt{\frac{\tau_b}{\tau_C}} * m_b * a_C * \frac{R_{b1} * R_{C1}}{s^2}$

Out[∘]=

$-2.30707755108571897079160145000529830584004558834087163900439681205925 \times 10^{-28}$

In[∘]:= $f_{bC} \Big/ \left(\delta_b * \delta_C * \frac{Aspin_b}{Aspin_C} * F_E\right)$

Out[∘]=

1.0000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $f_{bC} / -F_E$

Out[∘]=

0.99999999999999999995499724972223312837710942752851988761718194090541 58

Repulsive force (in N) that the positon **c** exercises over the positon **A**

In[∘]:= $f_{cA} = \delta_c * \sqrt{\frac{\tau_c}{\tau_A}} * m_c * a_A * \frac{R_{c1} * R_{A1}}{s^2}$

Out[∘]=

$2.30707755108571897183080345534109704717116974820409588105530050525711 \times 10^{-28}$

In[∘]:= $f_{cA} \Big/ \left(\delta_c * \delta_A * \frac{Aspin_c}{Aspin_A} * F_E\right)$

Out[∘]=

1.0000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= f_{cA} / F_E

Out[∘]=

1.0000000000000000000413361183209646807208973231300437583954118732248

Attractive force (in N) that the positon **c** exercises over the negaton **B**

In[∘]:= $f_{cB} = \delta_c * \sqrt{\frac{\tau_c}{\tau_B}} * m_c * a_B * \frac{R_{c1} * R_{B1}}{s^2}$

Out[∘]=

$-2.30707755108571897321449881650961562199733809349517074726818767015451 \times 10^{-28}$

In[∘]:= $f_{cB} \Big/ \left(\delta_c * \delta_B * \frac{Aspin_c}{Aspin_B} * F_E\right)$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $f_{cB} \, / \, -F_E$

Out[∘]=

1.00000000000000000060017445743129483755606512073293466578257092611551

Repulsive force (in N) that the positon **c** exercises over the positon ***C***

In[∘]:= $f_{cC} = \delta_c * \sqrt{\frac{\tau_c}{\tau_C}} * m_c * a_C * \frac{R_{c1} * R_{C1}}{s^2}$

Out[∘]=

$2.30707755108571897183080345534109704717116974820409588105530050525711 \times 10^{-28}$

In[∘]:= $f_{cC} \Big/ \left(\delta_c * \delta_C * \frac{Aspin_c}{Aspin_C} * F_E\right)$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $f_{cC} \, / \, F_E$

Out[∘]=

1.00000000000000000000041336118320964680720897323130043758395411873248

Attractive force (in N) that the negaton **d** exercises over the positon **A**

In[∘]:= $f_{dA} = \delta_d * \sqrt{\frac{\tau_d}{\tau_A}} * m_d * a_A * \frac{R_{d1} * R_{A1}}{s^2}$

Out[∘]=

$-2.30707755108571897079160145000529830584004558834087163900439681205925 \times 10^{-28}$

In[∘]:= $f_{dA} \Big/ \left(\delta_d * \delta_A * \frac{Aspin_d}{Aspin_A} * F_E\right)$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $f_{dA} \, / \, -F_E$

Out[∘]=

0.999999999999999999549972497222331283771094275285198876171819409054158

Repulsive force (in N) that the negaton **d** exercises over the negaton **B**

In[∘]:= $f_{dB} = \delta_d * \sqrt{\frac{\tau_d}{\tau_B}} * m_d * a_B * \frac{R_{d1} * R_{B1}}{s^2}$

Out[∘]=

$2.30707755108571897217529681117381688004294099968853937636104063402581 \times 10^{-28}$

In[∘]:= $f_{dB} \Big/ \left(\delta_d * \delta_B * \frac{Aspin_d}{Aspin_B} * F_E\right)$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= f_{dB} / F_E

Out[∘]=

1.00000000000000000014973359347041647424979351642272208857650777867004

Attractive force (in N) that the negaton **d** exercises over the positon **C**

In[∘]:= $f_{dC} = \delta_d * \sqrt{\frac{\tau_d}{\tau_C}} * m_d * a_C * \frac{R_{d1} * R_{C1}}{s^2}$

Out[∘]=

$-2.30707755108571897079160145000529830584004558834087163900439681205925 \times 10^{-28}$

In[∘]:= $f_{dC} \Big/ \left(\delta_d * \delta_C * \frac{Aspin_d}{Aspin_C} * F_E\right)$

Out[∘]=

1.00000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= $f_{dC} / -F_E$

Out[∘]=

0.999999999999999999549972497222331283771094275285198876171819409054158

8.- Mechanical nuclear forces

8.1 - Distances r (in m) between two tons

In[∘]:= $i15 = 10^{-15} * \xi$

Out[∘]=

$1.0000000000000000000000000000000000000000000000000000000000000000000000 \times 10^{-15}$

In[∘]:= $i14 = 10^{-14} * \xi$

Out[∘]=

$1.0000000000000000000000000000000000000000000000000000000000000000000000 \times 10^{-14}$

In[∘]:= $i13 = 10^{-13} * \xi$

Out[∘]=

$1.0000000000000000000000000000000000000000000000000000000000000000000000 \times 10^{-13}$

In[∘]:= $i12 = 10^{-12} * \xi$

Out[∘]=

$1.0000000000000000000000000000000000000000000000000000000000000000000000 \times 10^{-12}$

In[∘]:= **i11 = 10^{-11} * ζ**

Out[∘]=

$1.0000000000000000000000000000000000000000000000000000000000000000000000 \times 10^{-11}$

In[∘]:= **i10 = 10^{-10} * ζ**

Out[∘]=

$1.0000000000000000000000000000000000000000000000000000000000000000000000 \times 10^{-10}$

In[∘]:= **i9 = 10^{-9} * ζ**

Out[∘]=

$1.0000000000000000000000000000000000000000000000000000000000000000000000 \times 10^{-9}$

In[∘]:= **i8 = 10^{-8} * ζ**

Out[∘]=

$1.0000000000000000000000000000000000000000000000000000000000000000000000 \times 10^{-8}$

In[∘]:= **i7 = 10^{-7} * ζ**

Out[∘]=

$1.0000000000000000000000000000000000000000000000000000000000000000000000 \times 10^{-7}$

In[∘]:= **i6 = 10^{-6} * ζ**

Out[∘]=

$1.0000000000000000000000000000000000000000000000000000000000000000000000 \times 10^{-6}$

In[∘]:= **i5 = 10^{-5} * ζ**

Out[∘]=

0.00001000000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= **i4 = 10^{-4} * ζ**

Out[∘]=

0.0001000000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= **i3 = 10^{-3} * ζ**

Out[∘]=

0.001000000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= **i2 = 10^{-2} * ζ**

Out[∘]=

0.01000000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= **i1 = 10^{-1} * ζ**

Out[∘]=

0.1000000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= **i0 = 1 * ζ**

Out[∘]=

1.0000000000000000000000000000000000000000000000000000000000000000000000

In[∘]:= **Clear[r]**
borra

8.2 - Verification of the force of gravity between two neutrons for distances r.

In[∘]:=

$$\Sigma FijGnn[r\_] := \frac{f_{aa}}{r^2 - R_{a1}{}^2} + \frac{f_{ab}}{r^2 - R_{b1}{}^2} + \frac{f_{ac}}{r^2 - R_{c1}{}^2} + \frac{f_{ad}}{r^2 - R_{d1}{}^2} + \frac{f_{ba}}{r^2 - R_{a1}{}^2} + \frac{f_{bb}}{r^2 - R_{b1}{}^2} + \frac{f_{bc}}{r^2 - R_{c1}{}^2} + \frac{f_{bd}}{r^2 - R_{d1}{}^2} + \frac{f_{ca}}{r^2 - R_{a1}{}^2} + \frac{f_{cb}}{r^2 - R_{b1}{}^2} + \frac{f_{cc}}{r^2 - R_{c1}{}^2} + \frac{f_{cd}}{r^2 - R_{d1}{}^2} + \frac{f_{da}}{r^2 - R_{a1}{}^2} + \frac{f_{db}}{r^2 - R_{b1}{}^2} + \frac{f_{dc}}{r^2 - R_{c1}{}^2} + \frac{f_{dd}}{r^2 - R_{d1}{}^2}$$

In[∘]:=

$$FGnn[r\_] := -G * \frac{mn^2}{r^2}$$

In[∘]:= ΣFijGnn[i15]

Out[∘]=

$$-1.971930376398398788229708161204349709820924178723 \times 10^{-14}$$

In[∘]:= FGnn[i15]

Out[∘]=

$$-1.872396196453338047203517255490446164811427175670000000000000000000000 \times 10^{-34}$$

In[∘]:=

$$\frac{\Sigma FijGnn[i15]}{FGnn[i15]}$$

Out[∘]=

$$1.053158717227473940011382024176159063587901774298 \times 10^{20}$$

In[∘]:= ΣFijGnn[i14]

Out[∘]=

$$-3.091448466576423904928576612076541852439928822 5 \times 10^{-20}$$

In[∘]:= FGnn[i14]

Out[∘]=

$$-1.872396196453338047203517255490446164811427175670000000000000000000000 \times 10^{-36}$$

In[∘]:=

$$\frac{\Sigma FijGnn[i14]}{FGnn[i14]}$$

Out[∘]=

$$1.651065342063925645228083620750628093856107961 34 \times 10^{16}$$

As we can observe, the sum of all the self-propulsion forces between the tons of two **n**eutrons **ΣFijGnn(r)** leads us to an **attractive nuclear force** 10^{20} sometimes greater than the force of gravity **FGnn(r)** for distances **r** of 1 fermi (i15).

In[∘]:= ΣFijGnn[i13]

Out[∘]=

$-3.05404589932501723624431362546810187817055482 \times 10^{-24}$

In[∘]:= FGnn[i13]

Out[∘]=

$-1.87239619645333804720351725549044616481142717567000000000000000000000 \times 10^{-38}$

In[∘]:= $\frac{\text{ΣFijGnn[i13]}}{\text{FGnn[i13]}}$

Out[∘]=

$1.63108956593158036815989043689846173312678534 4 \times 10^{14}$

In[∘]:= ΣFijGnn[i12]

Out[∘]=

$-3.05367571855263799340565789179982859325391 6 \times 10^{-28}$

In[∘]:= FGnn[i12]

Out[∘]=

$-1.87239619645333804720351725549044616481142717567000000000000000000000 \times 10^{-40}$

In[∘]:= $\frac{\text{ΣFijGnn[i12]}}{\text{FGnn[i12]}}$

Out[∘]=

$1.63089186163529925354099708193237248370941 52 \times 10^{12}$

In[∘]:= ΣFijGnn[i11]

Out[∘]=

$-3.05367201731094217505039887244166829740 75 \times 10^{-32}$

In[∘]:= FGnn[i11]

Out[∘]=

$-1.87239619645333804720351725549044616481142717567000000000000000000000 \times 10^{-42}$

In[∘]:= $\frac{\text{ΣFijGnn[i11]}}{\text{FGnn[i11]}}$

Out[∘]=

$1.63088988489463783306484282295927826292396 \times 10^{10}$

In[∘]:= ΣFijGnn[i2]

Out[∘]=

$-1.87239622699005784455940581504 0 \times 10^{-60}$

In[∘]:= FGnn[i2]

Out[∘]=

$-1.87239619645333804720351725549044616481142717567000000000000000000000 \times 10^{-60}$

In[∘]:= $\frac{\text{ΣFijGnn[i2]}}{\text{FGnn[i2]}}$

Out[∘]=

1.0000000163088986482658098149140

In[∘]:= ΣFijGnn[i1]

Out[∘]=

$-1.872396196758705245177076141086 \times 10^{-62}$

In[∘]:= FGnn[i1]

Out[∘]=

$-1.87239619645333804720351725549044616481142717567000000000000000000000 \times 10^{-62}$

In[∘]:= $\frac{\text{ΣFijGnn[i1]}}{\text{FGnn[i1]}}$

Out[∘]=

1.0000000001630889864826580981491

In[∘]:= ΣFijGnn[i0]

Out[∘]=

$-1.872396196456391719183252844346 \times 10^{-64}$

In[∘]:= FGnn[i0]

Out[∘]=

$-1.87239619645333804720351725549044616481142717567000000000000000000000 \times 10^{-64}$

In[∘]:= $\frac{\text{ΣFijGnn[i0]}}{\text{FGnn[i0]}}$

Out[∘]=

1.0000000000016308898648265809815

8.3 - Verification of the electric force between two protons for distances r.

In[∘]:= ΣFijEpp[r_] :=

$$\frac{f_{AA}}{r^2 - R_{A1}{}^2} + \frac{f_{AB}}{r^2 - R_{B1}{}^2} + \frac{f_{AC}}{r^2 - R_{C1}{}^2} + \frac{f_{BA}}{r^2 - R_{A1}{}^2} + \frac{f_{BB}}{r^2 - R_{B1}{}^2} + \frac{f_{BC}}{r^2 - R_{C1}{}^2} + \frac{f_{CA}}{r^2 - R_{A1}{}^2} + \frac{f_{CB}}{r^2 - R_{B1}{}^2} + \frac{f_{CC}}{r^2 - R_{C1}{}^2}$$

In[∘]:= FEpp[r_] := $k * \frac{e^2}{r^2}$

In[∘]:= **ΣFijEpp[i15]**

Out[∘]=

305.79541891941046463817689278645919813247829078968750212681417704679

In[∘]:= **FEpp[i15]**

Out[∘]=

230.70775510857189718298497990348238400000000000000000000000000000000

In[∘]:= $\frac{\textbf{ΣFijEpp[i15]}}{\textbf{FEpp[i15]}}$

Out[∘]=

1.3254665790298295065992359396063441215749499045437939295249961876976

In[∘]:= **ΣFijEpp[i14]**

Out[∘]=

2.3127564943064669553610078082369605537691613186628816507666670985068

In[∘]:= **FEpp[i14]**

Out[∘]=

2.3070775510857189718298497990348238400000000000000000000000000000000

In[∘]:= $\frac{\textbf{ΣFijEpp[i14]}}{\textbf{FEpp[i14]}}$

Out[∘]=

1.0024615311340858275349830266382820072909805025715620132298994286393

As we can observe, the sum of all the self-propulsion forces between the tons of two **p**rotons **ΣFijEpp(r)** are repulsive forces and are practically equal to the electric force **FEp-p(r)** for all distances **r**. Conclusion: there are no nuclear forces between protons.

In[∘]:= **ΣFijEpp[i13]**

Out[∘]=

0.023071342024632880732225443945776205221706674666435568409971749672963

In[∘]:= **FEpp[i13]**

Out[∘]=

0.023070775510857189718298497990348238400000000000000000000000000000000

In[∘]:= $\frac{\textbf{ΣFijEpp[i13]}}{\textbf{FEpp[i13]}}$

Out[∘]=

1.0000245554717232808455798974391280848429340154802959398097431286035

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```

In[∘]:= ΣFijEpp[i1]

Out[∘]=

$2.3070775510857189718298497990914738248421864262054772367977843266468 \times 10^{-26}$

In[∘]:= FEpp[i1]

Out[∘]=

$2.30707755108571897182984979903482384000000000000000000000000000000000 \times 10^{-26}$

In[∘]:= $\frac{\text{ΣFijEpp[i1]}}{\text{FEpp[i1]}}$

Out[∘]=

1.0000000000000000000000000000245548680474684260681060269420125840715

In[∘]:= ΣFijEpp[i0]

Out[∘]=

$2.3070775510857189718298497990353903382052463038201694532339931660399 \times 10^{-28}$

In[∘]:= FEpp[i0]

Out[∘]=

$2.30707755108571897182984979903482384000000000000000000000000000000000 \times 10^{-28}$

In[∘]:= $\frac{\text{ΣFijEpp[i0]}}{\text{FEpp[i0]}}$

Out[∘]=

1.0000000000000000000000000000002455479682422065667253431118947342065

8.4 - Verification of the repulsive force that a neutron repels a proton for distances r

In[∘]:= $\text{ΣFijnp[r\_]} := \frac{f_{aA}}{r^2 - R_{A1}{}^2} + \frac{f_{aB}}{r^2 - R_{B1}{}^2} + \frac{f_{aC}}{r^2 - R_{C1}{}^2} + \frac{f_{bA}}{r^2 - R_{A1}{}^2} + \frac{f_{bB}}{r^2 - R_{B1}{}^2} + \frac{f_{bC}}{r^2 - R_{C1}{}^2} + \frac{f_{cA}}{r^2 - R_{A1}{}^2} + \frac{f_{cB}}{r^2 - R_{B1}{}^2} + \frac{f_{cC}}{r^2 - R_{C1}{}^2} + \frac{f_{dA}}{r^2 - R_{A1}{}^2} + \frac{f_{dB}}{r^2 - R_{B1}{}^2} + \frac{f_{dC}}{r^2 - R_{C1}{}^2}$

In[∘]:= $\text{FYannoe[r\_]} := e * \frac{mn}{r^2} * \sqrt{G * k}$

In[∘]:= ΣFijnp[i15]

Out[∘]=

$2.754855053866759572309294067039655612961542006162 \times 10^{-16}$

In[∘]:= FYannoe[i15]

Out[∘]=

$2.0784040106715974831294882372987441089309705768381040782320927253458 4 \times 10^{-16}$

In[∘]:= $\frac{\Sigma\text{Fijnp[i15]}}{\text{FYannoe[i15]}}$

Out[∘]=

1.3254665790298295055062983920558938139564193044146

In[∘]:= $\frac{\Sigma\text{Fijnp[i15]}}{\text{FEpp[i15]}}$

Out[∘]=

$1.194088622018932524109203221813327392873680689330 4 \times 10^{-18}$

In[∘]:= ΣFijnp[i14]

Out[∘]=

$2.083520066853074471158657969224590485360867081778 4 \times 10^{-18}$

In[∘]:= FYannoe[i14]

Out[∘]=

$2.0784040106715974831294882372987441089309705768381040782320927253458 4 \times 10^{-18}$

In[∘]:= $\frac{\Sigma\text{Fijnp[i14]}}{\text{FYannoe[i14]}}$

Out[∘]=

1.0024615311340858267083851593776091570208843704874

In[∘]:= $\frac{\Sigma\text{Fijnp[i14]}}{\text{FEpp[i14]}}$

Out[∘]=

$9.030992763431651672858050601437879271789297537254 \times 10^{-19}$

As we can observe, the sum of all the self-propulsion forces between the tons of a **n**eutron and a **p**roton **ΣFijnp(r)** are repulsive forces and lead us to obtain the repulsive Yannoe force **FYannoe(r)** for all distances **r** and, they are 10^{18} times smaller than the electrical forces **FEpp(r).**

In[∘]:= ΣFijnp[i13]

Out[∘]=

$2.0784550468625110813284762313672552260859208180201 \times 10^{-20}$

In[∘]:= FYannoe[i13]

Out[∘]=

$2.078404010671597483129488237298744108930970576838104078232092725345 84 \times 10^{-20}$

In[∘]:= $\frac{\text{ΣFijnp[i13]}}{\text{FYannoe[i13]}}$

Out[∘]=

1.0000245554717232800209914827335035614670491462839

In[∘]:= $\frac{\text{ΣFijnp[i13]}}{\text{FEpp[i13]}}$

Out[∘]=

$9.0090384949755272861739716438196419090007675049 27 \times 10^{-19}$

In[∘]:= ΣFijnp[i12]

Out[∘]=

$2.0784045210211000633629851527561948165269787734615 \times 10^{-22}$

In[∘]:= FYannoe[i12]

Out[∘]=

$2.078404010671597483129488237298744108930970576838104078232092725345 84 \times 10^{-22}$

In[∘]:= $\frac{\text{ΣFijnp[i12]}}{\text{FYannoe[i12]}}$

Out[∘]=

1.0000002455487479622999648650503425792986016358911

In[∘]:= $\frac{\text{ΣFijnp[i12]}}{\text{FEpp[i12]}}$

Out[∘]=

$9.0088194913213707957548728054119693579115765208 00 \times 10^{-19}$

- -

- -

- -

In[∘]:= ΣFijnp[i2]

Out[∘]=

$2.0784040106715974814157024569431279990522874125488 \times 10^{-42}$

In[∘]:= FYannoe[i2]

Out[∘]=

$2.078404010671597483129488237298744108930970576838104078232092725345 84 \times 10^{-42}$

In[ ]:= $\frac{\Sigma Fijnp[i2]}{FYannoe[i2]}$

Out[ ]=

0.99999999999999999917543183541017215133671091427584

In[ ]:= $\frac{\Sigma Fijnp[i2]}{FEpp[i2]}$

Out[ ]=

$9.00881727921756725531915585376084351597662313 9456 \times 10^{-19}$

In[ ]:= ΣFijnp[i1]

Out[ ]=

$2.07840401067159748141570245189066916411595036765 42 \times 10^{-44}$

In[ ]:= FYannoe[i1]

Out[ ]=

$2.078404010671597483129488237298744108930970576838104078232092725345 84 \times 10^{-44}$

In[ ]:= $\frac{\Sigma Fijnp[i1]}{FYannoe[i1]}$

Out[ ]=

0.99999999999999999917543183297924014341408896614224

In[ ]:= $\frac{\Sigma Fijnp[i1]}{FEpp[i1]}$

Out[ ]=

$9.00881727921756725531915583186102123840025041523 6 \times 10^{-19}$

In[ ]:= ΣFijnp[i0]

Out[ ]=

$2.07840401067159748141570245184014457576658699720 52 \times 10^{-46}$

In[ ]:= FYannoe[i0]

Out[ ]=

$2.078404010671597483129488237298744108930970576838104078232092725345 84 \times 10^{-46}$

In[ ]:= $\frac{\Sigma Fijnp[i0]}{FYannoe[i0]}$

Out[ ]=

0.99999999999999999917543183295493082333486274666091

In[ ]:= $\frac{\Sigma Fijnp[i0]}{FEpp[i0]}$

Out[ ]=

$9.00881727921756725531915583164202301562448668799 4 \times 10^{-19}$

8.5 - Verification of the attractive force that a proton has on a neutron for distances r.

In[∘]:=

$$\Sigma Fijpn[r\_] := \frac{f_{Aa}}{r^2 - R_{a1}{}^2} + \frac{f_{Ab}}{r^2 - R_{b1}{}^2} + \frac{f_{Ac}}{r^2 - R_{c1}{}^2} + \frac{f_{Ad}}{r^2 - R_{d1}{}^2} + \frac{f_{Ba}}{r^2 - R_{a1}{}^2} + \frac{f_{Bb}}{r^2 - R_{b1}{}^2} + \frac{f_{Bc}}{r^2 - R_{c1}{}^2} + \frac{f_{Bd}}{r^2 - R_{d1}{}^2} + \frac{f_{Ca}}{r^2 - R_{a1}{}^2} + \frac{f_{Cb}}{r^2 - R_{b1}{}^2} + \frac{f_{Cc}}{r^2 - R_{c1}{}^2} + \frac{f_{Cd}}{r^2 - R_{d1}{}^2}$$

In[∘]:= ΣFijpn[i15]

Out[∘]=

−21 888.893017593366647208961865557702186705944571978524113912661404 22

In[∘]:= -FYannoe[i15]

Out[∘]=

$-2.0784040106715974831294882372987441089309705768381040782320927253 4584 \times 10^{-16}$

In[∘]:=

$$\frac{\Sigma Fijpn[i15]}{-FYannoe[i15]}$$

Out[∘]=

$1.0531587172274739408797831772482121703258170824796581052217083711 12 \times 10^{20}$

In[∘]:=

$$\frac{\Sigma Fijpn[i15]}{FEpp[i15]}$$

Out[∘]=

−94.877144495174750714659069242018827127768303026074773482674332429 7

In[∘]:= ΣFijpn[i14]

Out[∘]=

−0.0343158082882653606842591870532000102561701205898258642727491506590

In[∘]:= -FYannoe[i14]

Out[∘]=

$-2.0784040106715974831294882372987441089309705768381040782320927253 4584 \times 10^{-18}$

In[∘]:=

$$\frac{\Sigma Fijpn[i14]}{-FYannoe[i14]}$$

Out[∘]=

$1.6510653420639256465894995435283248324160446570512672927026324398 6 \times 10^{16}$

In[∘]:=

$$\frac{\Sigma Fijpn[i14]}{FEpp[i14]}$$

Out[∘]=

−0.0148741459827027566546569096668128875720830654258928621417987446744

As we can observe, the sum of all the self-propulsive forces between the tons of a **p**roton and a **n**eutron **ΣFijpn(r)** are attractive forces and lead us to the Yannoe force **-FYannoe(r)** for large distances **r** except for small distances. For a distance **r** of 1 fermi (i15), we obtain an **attractive nuclear force** 94,87 times greater than the electric force **FEpp(r)**.

In[∘]:= ΣFijpn[i13]

Out[∘]=

$-3.3900630955967916728545495563518766478299965777587277339844209 08 \times 10^{-6}$

In[∘]:= -FYannoe[i13]

Out[∘]=

$-2.0784040106715974831294882372987441089309705768381040782320927253 4584 \times 10^{-20}$

In[∘]:= $\frac{\text{ΣFijpn[i13]}}{\text{-FYannoe[i13]}}$

Out[∘]=

$1.6310895659315803695048349705654029803551378085385282311907341 80 \times 10^{14}$

In[∘]:= $\frac{\text{ΣFijpn[i13]}}{\text{FEpp[i13]}}$

Out[∘]=

$-0.00014694187865515902656728168717059976598511443068181027169207 33540$

In[∘]:= ΣFijpn[i12]

Out[∘]=

$-3.3896521861944739984352468795959974556061308991345206382267469 \times 10^{-10}$

In[∘]:= -FYannoe[i12]

Out[∘]=

$-2.0784040106715974831294882372987441089309705768381040782320927253 4584 \times 10^{-22}$

In[∘]:= $\frac{\text{ΣFijpn[i12]}}{\text{-FYannoe[i12]}}$

Out[∘]=

$1.6308918616352992548857785949301122284238705951046496397457662 \times 10^{12}$

In[∘]:= $\frac{\text{ΣFijpn[i12]}}{\text{FEpp[i12]}}$

Out[∘]=

$-1.4692406783635389801924058826844975734332879836234386087702933 \times 10^{-6}$

- -
- -

In[∘]:= ΣFijpn[i2]

Out[∘]=

$-2.07840404456807784503552800071174235094308369363 72 \times 10^{-42}$

In[∘]:= -FYannoe[i2]

Out[∘]=

$-2.0784040106715974831294882372987441089309705768381040782320927253458 4 \times 10^{-42}$

In[∘]:= $\frac{\text{ΣFijpn[i2]}}{\text{-FYannoe[i2]}}$

Out[∘]=

1.000000016308898649090377995407153589173214264179 1

In[∘]:= $\frac{\text{ΣFijpn[i2]}}{\text{FEpp[i2]}}$

Out[∘]=

$-9.008817426141455217680977137985390404542574598487 \times 10^{-19}$

In[∘]:= ΣFijpn[i1]

Out[∘]=

$-2.0784040110105622884451965625373928708657561045970 \times 10^{-44}$

In[∘]:= -FYannoe[i1]

Out[∘]=

$-2.0784040106715974831294882372987441089309705768381040782320927253458 4 \times 10^{-44}$

In[∘]:= $\frac{\text{ΣFijpn[i1]}}{\text{-FYannoe[i1]}}$

Out[∘]=

1.0000000001630889873072262653289331119694740687292

In[∘]:= $\frac{\text{ΣFijpn[i1]}}{\text{FEpp[i1]}}$

Out[∘]=

$-9.008817280686806149650974268021032340426783773708 \times 10^{-19}$

In[∘]:= ΣFijpn[i0]

Out[∘]=

$-2.0784040106749871328792932481556493801732391748462 \times 10^{-46}$

In[∘]:= -FYannoe[i0]

Out[∘]=

$-2.0784040106715974831294882372987441089309705768381040782320927253458 4 \times 10^{-46}$

In[∘]:= $\frac{\text{ΣFijpn[i0]}}{\text{-FYannoe[i0]}}$

Out[∘]=

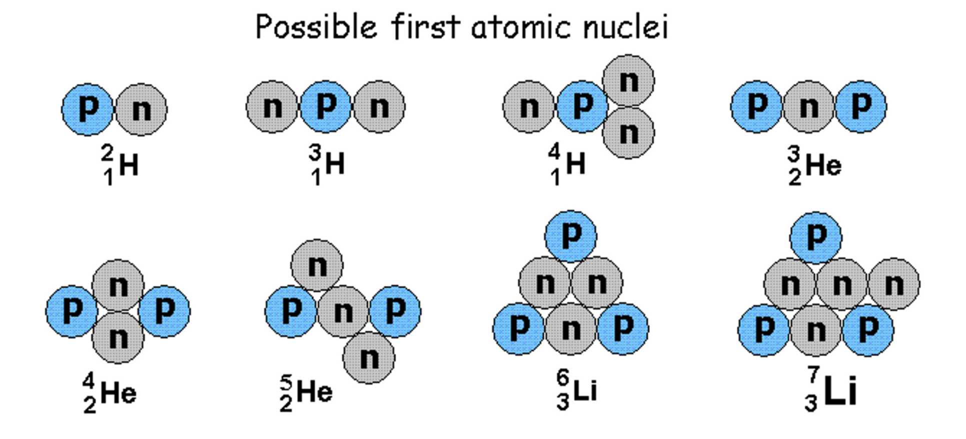
1.00000000000163089068939474802815090917407659098 85

In[∘]:= $\frac{\Sigma Fijpn[i0]}{FEpp[i0]}$

Out[∘]= $-9.008817279232259658970674239321388777592813769509 \times 10^{-19}$

8.6 - Summary of results and the possible first atomic nuclei

For distances **r** of 1 fermi (i15), the proton always attracts the neutron with a **nuclear force 94.87 times greater than the electric force**, and neutrons attract each other with a **nuclear force 10^{20} times greater than the force of gravity**. Furthermore, protons repel each other for all distances **r.** Therefore, we must consider the atomic nuclei as a cluster of protons and neutrons. The neutrons will be bound to each other by the strong attractive nuclear force, and these, in turn, will be bound to the protons, which strongly attract the neutrons with a nuclear force equivalent to 94.87 times the electric force.



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