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# ETHER OR RELATIVITY?

## THAT IS THE QUESTION

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### Abstract

The world-famous formula  $E = Mc^2$  can be derived quite easily from **Maxwell's formula** (from 1864) for calculating the **speed of light**  $c$  for the (currently still controversial) **ether medium**.

In short:  $E = Mc^2$  means **ether energy**.

Albert Einstein's **theory of relativity** (from 1905) – with time reduction and space dilatation – proves to be completely **superfluous** for the derivation of  $E = Mc^2$ .

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# Pressure is energy density

## § 1. Clarification of a misunderstanding

- (1a) Physicists and engineers often define **pressure** as a **force** distributed over an area, or as force per area  $p = F/A$ . Accordingly,  $10^5 \text{ N/m}^2 = 1 \text{ bar}$  has been determined as unit of pressure.<sup>1</sup>
- (1b) However, pressure is never represented as a vector, e.g. as  $\vec{p}$  ( $p$  with arrow), although „**force per area**“ actually means a **vector quantity**.
- (1c) In **fluid media** – apart from weight –, pressure is the **same** in all **directions**,<sup>2</sup> so that **only one value** can be assigned to it.
- (1d) For this simple reason<sup>3</sup> **pressure** per se must be a scalar quantity of the physical dimension **energy per volume** [ $E/L^3$ ].<sup>4</sup>
- (1e) Only pressure differences in the distance of the sides of parallel surfaces, or pressure gradients, are directed quantities, i.e. vectors.
- (1f) Thus, pressure in media certainly does **not** mean **force** per area, even if this is – erroneously – repeatedly claimed in textbooks until today.<sup>5</sup>
- (1g) Briefly: **Pressure means energy per volume:**

$$[p] \Leftrightarrow [E/V].$$

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<sup>1</sup>Meschede, (2015): Gerthsen Physik (20), 3.2.1 Druck und Kompressibilität, Seite 101 Gl.(3.2)

<sup>2</sup>This can be seen, for example, in hydraulic presses. – Meschede, (2015): Gerthsen Physik (20), 3.2.1 Druck und Kompressibilität, Seite 101.

<sup>3</sup>Madelung (1964), (17), Vektoranalysis, Definitionen, S. 166.

<sup>4</sup>Sommerfeld (1945), (28), §6. Hydrodynamik, S. 39.

<sup>5</sup>Bleck-Neuhaus (2013), (1), Antwort 10.11., S. 457 – oder Kneubühl (1994), (13), 4.1.1.3 Der isotrope Druck, S. 119, — oder Meschede, (2015): Gerthsen Physik (20), 3.2.1 Druck und Kompressibilität, Seite 101 Gl.(3.2)

## **E = mc<sup>2</sup> means Ether Energy**

### **§ 2. Newton's calculation of phase velocities**

(2a) The formula for **phase velocities** in media was first **derived** by **Newton** as a solution to the following problem (analogously):

(2b) **Density** and **elasticity** of a medium are given.  
The **phase velocity** is sought.<sup>6</sup>

(2c) The **solution** of this problem (2b) presented in Newton's „**Principia**“ is very **confusing**.<sup>7</sup> However, in Newton's treatise „**Opticks**“, the **formula** found by Newton is **explained** very well:

The phase velocity is proportional to the **square root** of two media properties: **directly** proportional to elasticity and **indirectly** proportional to density.<sup>8</sup>

(2d) Newton's **phase formula** is of great general importance, because:

**Elasticity** and **density** are **primordial** phenomena.<sup>9</sup>  
They relate to **all media**.

Comment: **Phase formula** is the **name** used hereafter for Newton's formula to calculate **phase velocities**.

(2e) Newton's phase formula is valid for **sound** and **light**.<sup>10</sup> The medium for **light** is the (currently still controversial) **ether medium**.<sup>11</sup>

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<sup>6</sup>Newton (Wolfers) (1713), (22), Abschnitt VIII, Von der in Flüssigkeiten fortgepflanzten Bewegung, S.364-365.

<sup>7</sup>Newton (Wolfers) (1713), (22), Abschnitt VIII, Von der in Flüssigkeiten fortgepflanzten Bewegung, S.364-365.

<sup>8</sup>Newton (1704), (23), Frage 21: „Ist nicht dieses Medium ...“, S. 109. – Concerning direct/indirect see: Newton (Wolfers) (1713), (22), (25) Zusatz 2., S.365-366.

<sup>9</sup>Born (1920), (2), 6. Der Äther als elastischer Festkörper, S. 94.

<sup>10</sup>Newton (Wolfers) (1713), (22), Abschnitt VIII, Von der in Flüssigkeiten fortgepflanzten Bewegung, S.366, §71 und 72.

<sup>11</sup>See e.g. the Wikipedia, keyword: „Luminousness aether“.

(2f) The most general form of Newton's phase formula is:<sup>12</sup>

$$\text{phase velocity} = \sqrt{\frac{\text{elasticity}}{\text{density}}}. \quad (1)$$

(2g) Of particular importance is the phase formula of the **homogeneous** and **isotropic** media – like water or air, but also the **ether medium**.

$$c = \sqrt{\frac{p}{\rho}}. \quad (2)$$

( $c$  = phase velocity,  $p$  = pressure,<sup>13</sup>  $\rho$  = density)

(2h) The basic phase formula for **light** and other **electromagnetic waves** is completely analogous to the phase formula of elastic waves, in that ( $\rho$  and  $\mu_0$ ), as well as ( $1/p$  and  $\epsilon_0$ ), correspond to each other.<sup>14</sup> Instead of (2), the phase formula for **electromagnetic** waves is

$$c = \sqrt{\frac{1/\epsilon_0}{\mu_0}} = \frac{1}{\sqrt{\mu_0 \cdot \epsilon_0}}. \quad (3)$$

( $c$  = phase velocity,  $\mu_0$  = permeability [= ether density],  $\epsilon_0$  = dielectricity [= ether compressibility] = 1 / ether elasticity).<sup>15</sup>

(2i) The constants  $\mu_0$  and  $\epsilon_0$  are – in a certain sense – „**material constants**“ of the **vacuum** (resp. the **ether medium**),<sup>16</sup> and thus two of the most **fundamental** constants of all physics.<sup>17</sup>

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<sup>12</sup>Meschede (2015), (20), 4.3.3 Elastische Wellen, S. 164-166.

<sup>13</sup>Pressure indicates elasticity in that higher pressure requires more force for compression.

<sup>14</sup>Meschede (2015), (20), 8.4.3. Gegenüberstellung der Beziehungen **elastischer** (Schall-) und **elektromagnetischer** (Licht-) Wellen, S. 446, Abb. 8.101.

<sup>15</sup>Meschede (2015), (20), 3.1.5. Gasdruck, S. 89.

<sup>16</sup>Sommerfeld (1949), (27), §6. Die Rolle der Lichtgeschwindigkeit, S. 38.

<sup>17</sup>Sommerfeld (1949), (27), §7 D. Die Fundamentalkonstanten  $\mu_0$  und  $\epsilon_0$ , S. 45-46.

(2j) Both,  $\mu_0$  and  $\epsilon_0$ , are also of great **technical** importance, especially to calculate the dimensions of **capacitors** and **coils**.<sup>18</sup>

(2k) A squared form of the phase formula (2) is

$$p = \rho c^2, \quad (4)$$

where  $\rho$  and  $p$  represent densities i.e. quantities **per volume**, – Pressure in particular means **energy per volume**, explicitly stated in (1g).

(2l) Thus the relation (4) also means

$$\frac{E}{V} = \frac{M}{V} c^2. \quad (5)$$

(2m) The above relation (5) gives immediately a formula, which, according to (2d), is valid for **any** volume  $V$  of **any** medium, is regarded to be the **most famous** formula of **all** physics,<sup>19</sup> and is called **energy-mass equivalence**:<sup>20</sup>

$$E = m c^2. \quad (6)$$

(2n) From (6) – or „Einstein’s first law“ – follows by simple transformation (7) – or „Einstein’s second law“:<sup>21</sup>

$$m = \frac{E}{c^2}. \quad (7)$$

(2o) Relation (7) is used as basis of the **only „presently taught“ definition of mass**:

The **mass** of elementary particles is a **concentration** of „pure energy“.<sup>22</sup>

<sup>18</sup>Häberle (1996), (12), Kondensatoren, S. 60, Spulen, S. 74.

<sup>19</sup>Meschede (2015), (20), 13 Relativistische Physik, S. 617, siehe die **Fussnote**.

<sup>20</sup>Meschede (2015), (20), Der 4-Impuls, S. 649.

<sup>21</sup>Wilczek (2008), (32), 3 Einstein’s Second Law, p. 19-20.

<sup>22</sup>Born (1920), (2), 8. Die Trägheit der Energie, S. 247 – siehe auch 13. Die einheitliche Feldtheorie, S. 321. — siehe auch Einstein/Infeld (1938), (6), Feld und Materie, S.232-233.

Remark: By „**pure energy**“ modern physicists understand – without ever saying it – a form of energy **without** energy **carrier**.

- (2p) A much **clearer** mass concept is possible if a material **ether medium** is assumed:

- (2pa) Mass is **generated** by **compression** of the ether medium in a limited volume  $V$ .
- (2pb) The **emerged** mass **consists** of the **surplus** of material in the compressed state  $\rho$  – over the ground state  $\rho_0$  of the ether medium.
- (2pc) The corresponding **mass formula** is

$$m = \int (\rho - \rho_0) dV. \quad (8)$$

- (2q) In this way generated **mass** naturally contains energy.

The energy  $E = mc^2$  contained in a mass  $m$  consisting of compressed ether medium in a volume  $V$  is **elastic** (mechanical) **energy**.<sup>23</sup>

- (2r) Conclusion: The world famous formula  $E = mc^2$ :

- (2r1) is of **great** physical importance,
- (2r2) came **to light** by the theory of relativity,
- (2r3) does **not** presuppose **relativistic** principles.

- (2s) Historically conditioned, countless theories and equations – all those which apply the formula  $E = mc^2$  – are called „Einstein's“ or „relativistic“.<sup>24</sup>

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<sup>23</sup>This relationship also applies to the increased particle mass which is built up during relative motion with respect to the (directly) surrounding medium.

<sup>24</sup>Some examples (out of many):

Gandzha and Kadeisvily (2010), (9), Einstein's  $E = mc^2$ , p. 290.

Da **Energie und Masse** nach Einstein gleichwertig sind. – siehe Resag (2018), (25), Der Dirac-See, S. 110.

Nun entspricht **nach Einstein** jede **Energie** einer **Masse**. – siehe Resag (2018), (25), Die gezähmte Unendlichkeit, S. 149.

Einstiens Prinzipien: Die Äquivalenz – Fölsing (1993), (8), S. 221.

- (2t) A particularly important example of the application of  $E = m.c^2$  is Dirac's „Quantum theory of the electron“,<sup>25</sup> which is virtually always referred to as relativistic.<sup>26</sup>
- (2u) However, calling Dirac's equations relativistic may be questioned, since its analysis **without electron** – simply set  $m_e = 0$  – shows:

**Dirac's complex wave functions are an unusual representation of Maxwell's electromagnetic equations for empty space (i.a. the material ether medium).**<sup>27</sup>

- (2v) In this sense, here is asserted:

In cosmology and elementary particle physics

## **E=Mc<sup>2</sup> IS AN ETHER RELATION.**

- (2w) Einstein conjectured that quantum mechanics is of provisional validity.<sup>28</sup> Considering (2u), the „True Jacob“ – in the sense of Einstein<sup>29</sup> – shows even more:

**Quantum mechanics reveals only a small part of the ether mechanics, ceaselessly creating all natural phenomena.**<sup>30</sup>

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<sup>25</sup> Dirac (1928), (4), §1. Previous Relativity Treatments, p. 611, Equ. (1).

<sup>26</sup> Meschede (2015), (20), Relativistische Physik – Ausblick, S. 666, —

Bleck-Neuhaus (2013), (1), Das Elektron als Fermion und Lepton, S. 429-431, Fussnote 11, S. 430, 11.1 Pionen, S. 485, —

Laughlin (2007), (15), Die Nuklearfamilie, S. 160. —

Wilczek (2008), (32), Unification SUSY, p. 186, Glossary, p. 226, —

Unzicker (2010), (29), Warum gibt es den Spin?, S. 287, —

Simonyi (2004), (26), 5.3.11 Operatoren und Quantenelektrodynamik, S. 458, —

Gassner/Müller (2019), (10), Quantenmechanik – Relativistische Darstellung, S. 400, —

Resag (2018), (25), Glossar, S. 328. —

Meyenn (1998), (21), 2. Bd., Diracs erstaunliche Materie-Antimaterie-Gleichung, S. 358.

<sup>27</sup> Zwiauer, (2020), (33), The empty Dirac equation, p. 199-202.

<sup>28</sup> Fölsing (1993), (8), Einheitliche Theorie in zerrissener Zeit, S. 626. — siehe auch Pais (1986), (24), 25 Einsteins Reaktion auf die neue Dynamik, S. 447.

<sup>29</sup> Fölsing (1993), (8), 4 . »nicht der wahre Jakob« – Kritik an der Quantenmechanik, S. 665.

<sup>30</sup> A corresponding article (by the author) is in preparation.

## Call for Ether Debates

### § 3. Einstein's ether taboo is scientifically unacceptable

- (3a) Maxwell published his „**phase formula**“ to calculate the velocity of light  $c$  about 1865.<sup>31</sup>
- (3b) In today's notation, Maxwell's phase formula for electromagnetic waves (including light) in **vacuum** (resp. the ether medium) is

$$c = \sqrt{\frac{1}{\mu_0 \cdot \varepsilon_0}}. \quad (9)$$

- (3c) This significant formula (9) was **ignored** by **Albert Einstein** during his entire life.
- (3d) **Einstein** also **never** referred to  $\mu_0$  and  $\varepsilon_0$ , neither in one of his theories, nor in any other of his numerous publications.<sup>32</sup>
- (3e) Origin of this „strange“ behavior were probably the following intentions:
  - (3e1) Newton's **mechanics** should be adapted according to Maxwell's **electrodynamics** – by including the phase velocity of electromagnetic waves in vacuum.<sup>33</sup>
  - (3e2) The incomprehensible **contradictions** about the **ether** denounced around 1865 by Stokes<sup>34</sup> and again 1885 by Hertz<sup>35</sup> should be **avoided** by means of a theory **without ether medium**.<sup>36</sup>
  - (3e3) **No questions** concerning the meaning of  $\mu_0$  and  $\varepsilon_0$  should arise – because these would **point to** an ether medium.

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<sup>31</sup>Maxwell (1865), (19), Propagation with V, p. 498, EQ(71).

<sup>32</sup>A thorough search for it has been fruitless so far.

<sup>33</sup>Pais (1986), (24), 6b Die Vorläufer – Poincaré, S. 126.

<sup>34</sup>Born (1920), (2), Der Äther als elastischer Festkörper, S. 100.

<sup>35</sup>Genz (2004), (11), Lichtäther? S. 36.

<sup>36</sup>Pais (1986), (24), Die **ästhetischen Ursprünge** der Relativitätstheorie, S. 134.

- (3f) **Without ether medium, a speed of light independent of the state of the emitting body could be explained only purely experimentally**, – which is trivial, since its experimental determination is possible for waves in any medium, **including Maxwell's electromagnetic waves.**<sup>37</sup>
- (3g) The constant speed of light presupposed by Einstein in 1905 is not a principle in the sense of a fact, which cannot be explained further,<sup>38</sup> since Maxwell could calculate its (constant) value already about two decades before by means of relation (9).<sup>39</sup>
- (3h) **Both theories of relativity cannot** be regarded as **fundamental**, since Maxwell's phase formula (9) requires the assumption of some kind of (ether) medium – in accordance with Maxwell's lifelong conviction.<sup>40</sup>
- (3i) Einstein's only seemingly unacceptable presupposition of 1905 turned out to be the origin of a worrisome development of theoretical physics.
- (3i1) **1905**, Albert Einstein **declares** that the assumption of a light ether, hitherto considered to be indispensable, would prove to be **superfluous**.<sup>41</sup>
- (3i2) **1920** Max Born **demands**, the substantial ether disappears from now on – from the theory.<sup>42</sup>
- (3i3) **1938** Albert Einstein **recommends** – together with co-author Leopold Infeld in a popular science book – the term ether should be **dropped** altogether. Nobody should use or even pronounce the word ether anymore **under any circumstances**.<sup>43</sup>
- (3i4) Since about **1945**, all universities worldwide followed Einstein's ether taboo of 1938, with the result, that practically all ether research was stopped – until today.

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<sup>37</sup>Esfeld (2011), (7), Von Raum und Zeit **zur Raumzeit** – Die Grundlagen, S. 30-31.

<sup>38</sup>Brugger/ Schöndorf (2010), (3), Phil. Wörterb., Stichwort: **Prinzip**, S. 376.

<sup>39</sup>Meyenn (1998), (21), Mitwirkung bei absoluten Massensystemen, 2. **Bd.**, S. 20.

<sup>40</sup>Maxwell (1878), (18), see **summary** in the last paragraph.

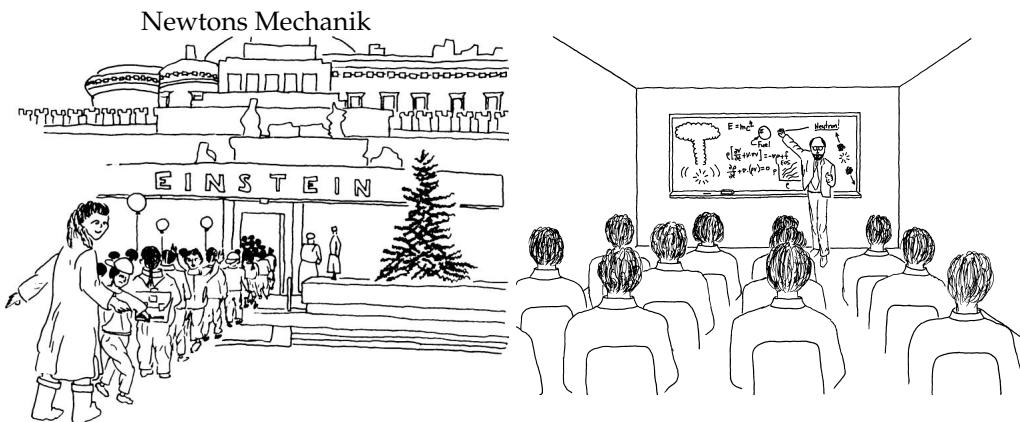
<sup>41</sup>Einstein (1905), (5), Die Grundlagen, S. 891-892.

<sup>42</sup>Born (1920), (2), Die Kontraktionshypothese, S. 193.

<sup>43</sup>Einstein/Infeld (1938), (6), Äther und Bewegung, S. 178-179.

- (3j) **Robert Betts Laughlin – Nobel Prize 1998** - did not miss the opportunity to point, in 2005, to the ether taboo<sup>44</sup> by recording the current state of teaching theoretical physics in two characteristic drawings.

„Targeted“ ADMISSION to the Einstein tempel  
for „higher“ INITIATION into modern physics.



– Laughlin's View of Physics Education in Schools and Universities –  
Two cartoons by Robert Laughlin **for Lectures** on his book:  
**The Crime of Reason** (16)   Source: [Laughlins Internet-Portal](#).

- (3k) Only references to the **failure** of previous **ether theories** are admitted nowadays. An example in the sense of (3e2) und (3i2):

Lorentz's auxiliary hypothesis has also been called the **death cry of the ether**. Einstein adopted it and built it into a much **larger framework**, in which the so contradictory concept of the **ether disappeared** completely.<sup>45</sup>

- (3l) After confirmation of the General Theory of Relativity (1919), Einstein rose to become the **star of the mass media**. Nevertheless, the theory of relativity was not only celebrated, but also denigrated, for example, as „**scientific Dadaism**“.<sup>46</sup>

<sup>44</sup>Laughlin (2007), (15), Das Gewebe der Raumzeit, S. 184.

<sup>45</sup>Meschede (2015), (20), 13.1.3 Das Relativitätspostulat, S. 623.

<sup>46</sup>Wazeck (2005), (30), Wer waren Einsteins Gegner? S. 17-18.

- (3m) On the other hand, several Einstein opponents, – or „**world puzzle solvers**“ –, strove for very valuable goals, especially a **revision** of the mechanistic worldview and a corresponding **life reform**.<sup>47</sup>
- (3n) The last big dispute about ether and relativity, which took place in 1920 in Bad Nauheim (under police protection), was quite violent in **content**.<sup>48</sup> The main participants were **Planck** (chair), **Einstein**, **Gehrke**, **Lenard**, and **Weyl**.<sup>49</sup>
- (3o) The present **ether taboo** – of which most physicists are not even aware – should be **lifted** as soon as possible for a simple reason: **Einstein's** decision to **delete the word ether** from the vocabulary of physics – which is followed worldwide –, **is unscientific** in the highest degree.
- (3p) Ether **debates** should be **allowed** again. One of the most important **reasons** for **ether debates** of various kinds – in physics, chemistry, biology, medicine, psychology, philosophy, cosmology, etc. – is an **expansion** of our **worldview**, because:

**The ETHER medium  
is the BASE of ALL natural PHENOMENA  
of our wonderful world.**

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<sup>47</sup>Wazeck (2009), (31), Liste der **Einsteingegner**, S. 25. – 1.3.2 **Lebensreform**, S. 44-50.

<sup>48</sup>Fölsing (1993), (8), Relativität im Rampenlicht, S. 526-527.

<sup>49</sup>Kostro (2000), (14), 3.3 The anti Einstein campaign over the ether, 3.4 Preparations for an extensive Presentation of the new ether concept, 3.5 The Einstein Debate in Bad Nauheim, 3.6 Lenard's Reaction to Einstein's Response, 3.7 Weyl replies to Lenard's objections, p. 79-91.

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*See also* [www.QQL.ch](http://www.QQL.ch).