Spinori e Vettori

(in 3'*)

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* per studenti di fisica del III anno

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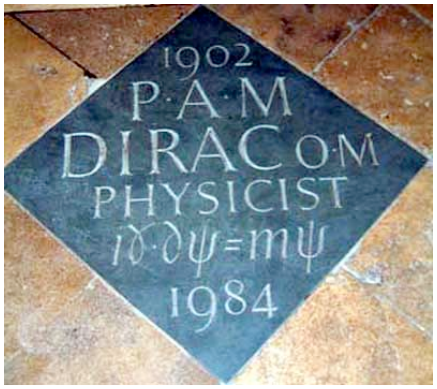
P.A.M. Dirac

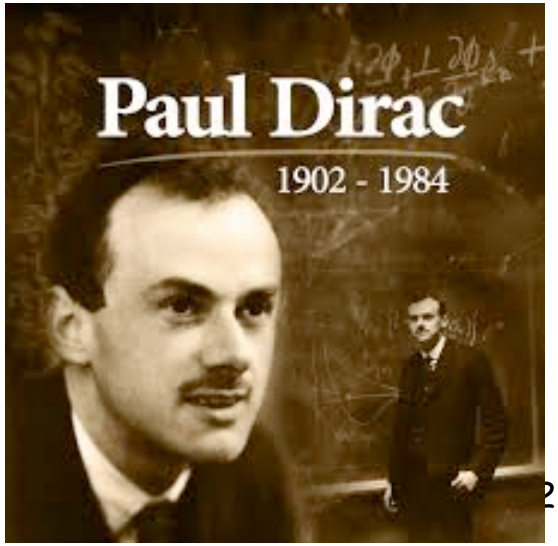
- Dirac equation introduces spinors in physics in 1928

Dirac equation

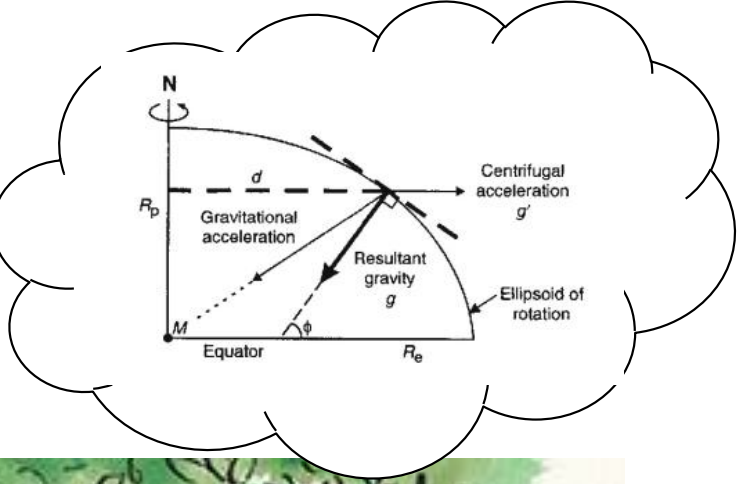
$$i\hbar\gamma^\mu \partial_\mu \psi - mc\psi = 0$$

- But spinors have a longer history





$\vec{F} = m\vec{a}$



Isaac Newton (1642 – 1727)

21 X 2014

The vector-algebra "war" ~1890

- pro algebra (Clifford or geometric algebra)

  Hamilton, Maxwell, …

Figura 1: William Rowan Hamilton 1805-1865. Scopritore dei quaternioni e una delle figure chiavi della comunità scientifica del XIX secolo.

- pro vectors

  Gibbs, Minkowski, …

- Since some 50 years (after Hestenes ~1960) there is a resurgence of interest into Clifford or Geometric algebra in almost any field of science and in particular in physics

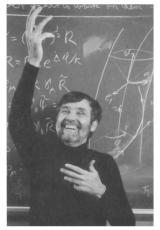
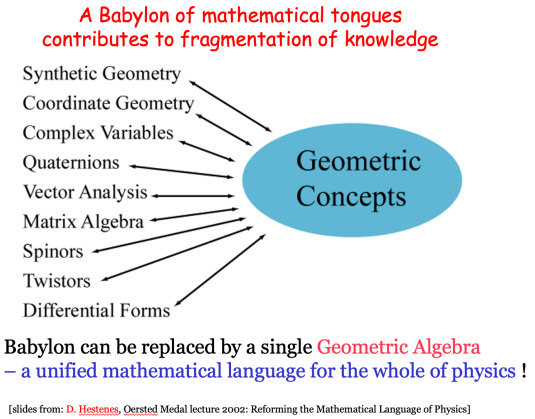


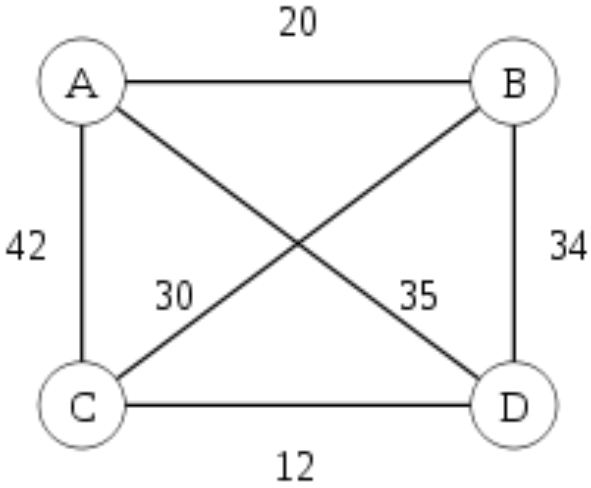
Figura 4: David Orlin Hestenes. Inventore del calcolo geometrico e primo ad aver attirato l'attenzione sulla natura di linguaggio universale dell'Algebra di Clifford per ogni branca della scienza.

- Spinors and Clifford algebra, beyond Dirac equation, can be very neatly applied to:
  - classical mechanics
  - Maxwell equations
  - ....
  - complex problems



Complex problems & spinors

Complex problems…

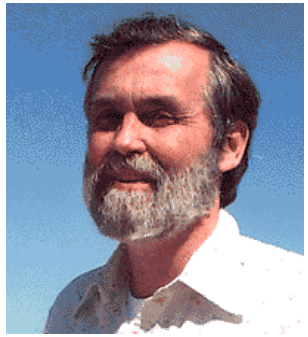


…. can be formulated very, very neatly in term of spinors…

… in Clifford algebra

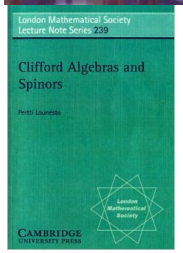
Bibliografia

Referenze (abbordabili)

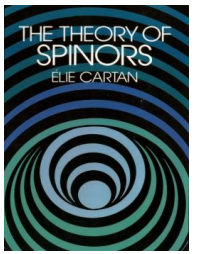


- David Hestenes (1933)
  - Oersted Medal Lecture 2002: Reforming the Mathematical Language of Physics (Am. Jour. Phy., 71, 2003)

- Pertti Lounesto (1945 - 2002)
  - Clifford algebras and spinors (2001)



Referenze (+ toste, libri)



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