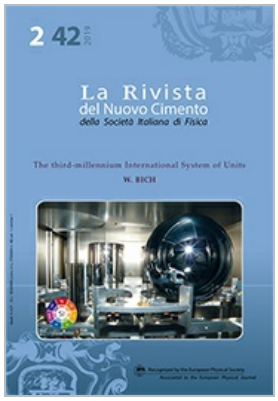
Editoria - marzo 2019

28-03-2019 http://www.primapagina.sif.it/article/916

La Rivista del Nuovo Cimento Vol. 42 N. 2 (2019)
The third-millennium International System of Units
W. Bich



On 16th November 2018, the 26th Conférence Générale des Poids et Mesures (CGPM) adopted the new International System of Units, SI, in its meeting in a public session in Versailles. It was attended by some 670 persons, including Delegations from 72 Parties of the Metre Convention, and by many more through the web. In the quest for an adequate media coverage, the Director of the International Bureau of Weights and Measures, BIPM, the organizing institute, had been asked, by a representative of a major news organization, "give me a good reason why we should cover such event, when President Trump is going to visit Paris these same days". The reply was that in one year nobody would remember Trump's visit, whereas in a century the date of the revision of the International System of Units still would be celebrated. This reply fully captures the importance of this true landmark not only for metrology but for science at large. Measurement units (well, most of them) now rest on universal physical constants, preserving at the same time the continuity with the past, so that the impact on everyday life will be imperceptible. Perhaps more important, many of the fundamental constants of physics acquire an exact value, their uncertainty being transferred to the base units of the SI. In this review, an account of the fascinating history behind the epochal event is given and the new SI is discussed. This will be a very useful reference for those in the future who wish to know how such a big change took place.

EPJ E – Topical Review
Gyrotactic phytoplankton in laminar and turbulent flows: A dynamical systems approach
M. Cencini, G. Boffetta, M. Borgnino, F. De Lillo

Biological and geophysical fluids host a sea of microorganisms many of which are motile. An often overlooked aspect of the life of such microorganisms is that the fluids where they are suspended are not still but flowing. In this brief review published in EPJ E, the authors aim to describe some of the interesting phenomena that can emerge due to the modification of the microorganisms' swimming direction by velocity gradients, which affect both the individual motion of microorganisms and their spatial distribution in dilute suspensions. More specifically, the review focuses on the case study of gyrotactic phytoplankton; bottom heavy, motile cells whose swimming direction is determined by a balance between a buoyancy torque directing them upwards and fluid velocity gradients. Gyrotaxis has become a paradigmatic model for phytoplankton motility in flows, due to the availability of a mechanistic

description which has revealed rich and predictive feed-back on the fluid and stochasticity (e.g. in cell orientation). In this review, the authors consider recent theoretical, numerical and experimental results to show how gyrotaxis can produce inhomogeneous phytoplankton distributions on a wide range of scales, from millimeters to kilometers, in both laminar and turbulent flows. In particular, they focus on the phenomenon of gyrotactic trapping in nonlinear shear flows and in fractal clustering in turbulent flows, demonstrating the usefulness of ideas and tools borrowed from dynamical systems theory.
Read more