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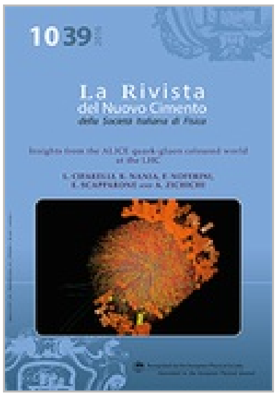
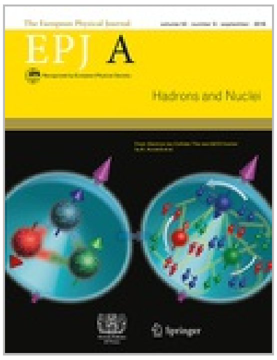
Il Nuovo Cimento, Vol. 39, N. 2 (2016)
Selection of the best communications presented at the 101st National Congress of the Italian Physical Society Roma, 21-25 September 2015, particularly celebrating the International Year of Light and Light-based Technologies (IYL 2015).

La Rivista del Nuovo Cimento, Vol. 39, N. 10 (2016)
Insights from the ALICE quark-gluon coloured world at the LHC
L. Cifarelli, R. Nania, F. Noferini, E. Scapparone, A. Zichichi
Interactions among heavy ions at the CERN LHC collider recreate the state of matter as it was a few micro-seconds after the Big Bang: the Quark Gluon Coloured World (QGCW). At a centre-of-mass energy of 2.76 TeV the produced QGCW reaches unprecedented temperatures, volumes and durations allowing more refined studies of its properties. Data collected during LHC Run1 (from 2010 to 2013) already provided new and sometimes unexpected results, and pointed to intriguing similarities among high multiplicity events produced in different colliding systems, namely pp, p-Pb and Pb-Pb. A comprehensive review of these results is presented, showing how heavy-ion physics is a powerful tool to shed light on QCD in such extreme conditions when multiple phase transitions should occur to go from the QGCW to our present non-coloured world.



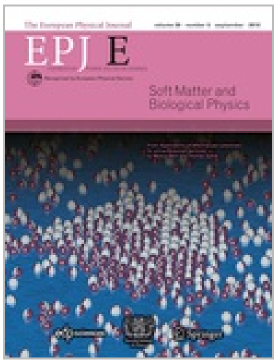
EPJA – Highlights
Complete kinematical study of the 3α breakup of the 16.11 MeV state in ^{12}C
by *H.K. Laursen, H. O. U. Fynbo, O.S. Kirsebom, K.S. Madsbøl, K. Riisager*
Regardless of the scenario, breaking up is dramatic. Take for example the case of carbon (^{12}C) splitting into three nuclei of helium. Until now, due to the poor quality of data and limited detection capabilities, physicists did not know whether the helium fragments were the object of a direct breakup in multiple fragments up front or were formed in a sequence of successive fragmentations. The question has been puzzling physicists for some time. Now, scientists from Denmark's Aarhus University have used a state-of-the-art detector capable of



measuring, for the first time, the precise disintegration of the ^{12}C into three helium nuclei.
Read more

EPJE – Colloquium

Perspective: parameters in a self-consistent field theory of multicomponent wormlike-copolymer melts

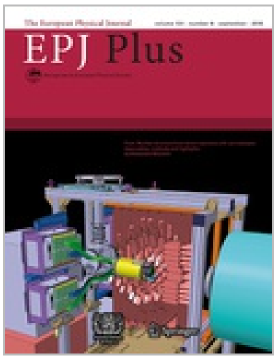


by *Ying Jiang, Shiben Li, Jeff Z.Y. Chen*

The self-consistent field theory (FCFT) is a convenient theoretical tool to describe the ordered structures of copolymer melts. It supports the current understanding of many polymeric systems. In a new EPJ E Colloquium Ying Jiang and colleagues showcase the versatility and power of the wormlike-chain formalism for calculating the microphase-separated crystallographic structures of multi-component wormlike polymers.
Read more

EPJ Plus – Highlights

Giant effect of Sm atoms on time stability of (NdDy)(FeCo)B magnet



by *R. B. Morgunov, E. I. Kunitsyna, V. V. Kucheryaev, V. P. Piskorskii, O. G. Ospennikova, E. N. Kablov*

For physicists, loss of magnetisation in permanent magnets can be a real concern. In response, the Japanese company Sumitomo created the strongest available magnet — one offering ten times more magnetic energy than previous versions — in 1983. These magnets are a combination of materials including rare-earth metal and so-called transition metals, and are accordingly referred to as RE-TM-B magnets. A Russian team has now been pushing the boundaries of magnet design. They have developed methods to counter the spontaneous loss of magnetisation, based on their understanding of the underlying physical phenomenon. Roman Morgunov from the Institute of Problems of Chemical Physics at the Russian Academy of Sciences and colleagues have now developed a simple additive-based method for ensuring the stability of permanent magnets over time, with no loss to their main magnetic characteristics.
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