

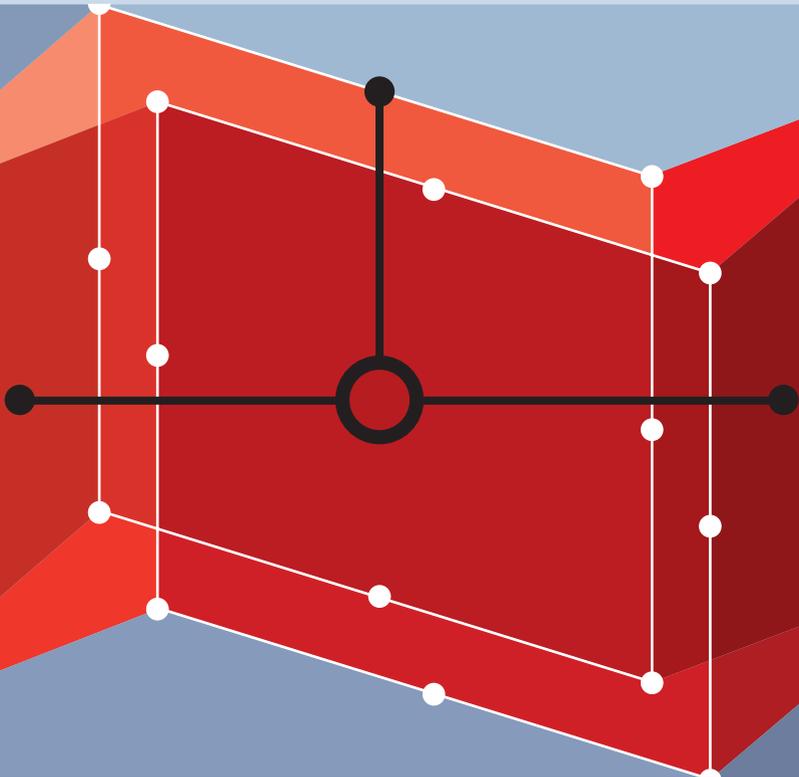
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THE FRONTIERS OF PHYSICS

Highlights 2016

A compilation of the best papers
published within the last year



ecp sciences

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Welcome

Professor Giorgio Benedek
Editor-in-Chief, EPL

The first issue of *Europhysics Letters* was published in January 1986. We celebrated our 30th birthday with a few significant events: a special EPL session with three magnificent talks at the EPS Condensed Matter Division (CMD) Conference in Groningen in early September, EPL's support for the 2016 EPS CMD Prize, and, in early October, the Plenary Editorial Board Meeting in Como, associated with the EPS Edison Volta Prize ceremony.

The aim of this Highlights collection is to show, within the limited space available, that EPL excellently covers all the disciplinary and cross-disciplinary sections of physics, as listed in the contents. This booklet includes many of our Editor's Choice articles, and is complemented by other letters with high visibility. The full Highlights collection can be found online at epjjournal.org/highlights-2016.

The first mission of EPL is the capillary dissemination of the best physics. A journal successfully offering this service to the physics community stimulates the best research and the production of the best papers, especially by young researchers aiming for worldwide visibility. For this reason, EPL is also sponsoring poster or best-presentation prizes for young scientists at many international meetings. The lists of meetings sponsored in 2016 and for 2017 events where EPL may be present with a sponsorship or an exhibit of materials are also listed in this booklet. If you are organizing a meeting and are interested in an EPL sponsorship, feel free to contact EPL at info@epjjournal.org.



From the Executive Editor

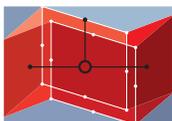
Dr Graeme Watt
Executive Editor, EPL

EPL is a top-tier, highly reputable source for novel, original, timely and relevant research letters in physics and physics-related topics. Rapid publication from submission to online with a median within 100 days, together with extensive marketing and promotional activities ensure your research articles reach a worldwide audience.

I hope that you enjoy the current selection of articles highlighted in this booklet. The full-text content of all the articles is freely available online throughout 2017. Thank you for your support and please continue to strengthen EPL with more top-quality submissions.

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Front cover image: Sketch of the Brillouin zone of an In_2O_3 crystal, adapted from V. Scherer, C. Janowitz, Z. Galazka, M. Nazarzadehmoafi and R. Manzke 2016 *EPL* **113** 26003.

QUANTUM STATISTICS, QUANTUM SYSTEMS, QUANTUM MECHANICS & QUANTUM INFORMATION



Young-Sea Huang

Critique and correction of the currently accepted solution of the infinite spherical well in quantum mechanics

Young-Sea Huang and Hans-Rudolf Thomann

2016 *EPL* **115** 60001

An error in the currently accepted solution of the problem of the infinite spherical well is pointed out. The problem is then solved by considering the self-adjointness of the Hamiltonian operator. In contrast to the currently accepted solution, the radial probability density for finding the particle at the center of the spherical well is not necessarily zero, in accordance with the solutions obtained.



Eric A. Galapon

Internal one degree of freedom is sufficient to induce exact decoherence

Eric A. Galapon

2016 *EPL* **113** 60007

Current quantum orthodoxy claims that the statistical collapse of the wave function arises from the interaction of the measuring instrument with its environment through the phenomenon known as environment-induced decoherence. Here it is shown that there exists a measurement scheme that is exactly decohering without the aid of an environment. The scheme relies on the assumption that the meter is decomposable into probe and pointer, with the probe taken to be inaccessible for observation. Under the assumption that the probe and the pointer initial states are momentum limited, it is shown that coherences die out within a finite measurement time and the pointer states are exactly orthogonal after a sufficiently longer time of measurement. Furthermore, it is shown that the measurement scheme reproduces the main result of the environment-induced decoherence theory that coherences decay asymptotically in time for a general initial state of the probe.