



Decay event of a doubly charmed cascade particle, reconstructed from tracks of its decay products. The  $\Xi_{cc}^+$  is formed in a collision of a  $\Sigma^-$  with a target (red area) and then decays:  $\Xi_{cc}^+ \rightarrow \Lambda_c^+ K^- \pi^+$ ,  $\Lambda_c^+ \rightarrow p K^- \pi^+$ . 16 such events over the expected background are reported; if confirmed, this would be the first observation of a doubly charmed baryon. See article 112001.

# PHYSICAL REVIEW LETTERS

## Contents

|                                                                                                                                           |                  |
|-------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| VOLUME 89, NUMBER 11                                                                                                                      | 9 September 2002 |
| <b>General Physics</b>                                                                                                                    |                  |
| Dynamics of Dark Solitons in Elongated Bose-Einstein Condensates .....                                                                    | 110401           |
| A. Muryshev, G. V. Shlyapnikov, W. Ertmer, K. Sengstock, and M. Lewenstein                                                                |                  |
| Crossover from One to Three Dimensions for a Gas of Hard-Core Bosons .....                                                                | 110402           |
| Kunal K. Das, M. D. Girardeau, and E. M. Wright                                                                                           |                  |
| Out-of-Equilibrium States as Statistical Equilibria of an Effective Dynamics in a System with Long-Range Interactions .....               | 110601           |
| Julien Barré, Freddy Bouchet, Thierry Dauxois, and Stefano Ruffo                                                                          |                  |
| <b>Elementary Particles and Fields</b>                                                                                                    |                  |
| First Observation of the Doubly Charmed Baryon $\Xi_{cc}^+$ .....                                                                         | 112001           |
| M. Mattson <i>et al.</i> (SELEX Collaboration)                                                                                            |                  |
| <b>Nuclear Physics</b>                                                                                                                    |                  |
| Relativistic Hydrodynamic Scaling from the Dynamics of Quantum Field Theory .....                                                         | 112301           |
| Luís M. A. Bettencourt, Fred Cooper, and Karen Pao                                                                                        |                  |
| <b>Atomic, Molecular, and Optical Physics</b>                                                                                             |                  |
| Slow-Down Collisions and Nonsequential Double Ionization in Classical Simulations .....                                                   | 113001           |
| R. Panfili, S. L. Haan, and J. H. Eberly                                                                                                  |                  |
| Direct and Indirect Pathways in Strong Field Atomic Ionization Dynamics .....                                                             | 113002           |
| Armelle de Bohan, Bernard Piraux, Lino Ponce, Richard Taïeb, Valérie Vénier, and Alfred Maquet                                            |                  |
| “Two-Photon” Coincidence Imaging with a Classical Source .....                                                                            | 113601           |
| Ryan S. Bennink, Sean J. Bentley, and Robert W. Boyd                                                                                      |                  |
| <b>Nonlinear Dynamics, Fluid Dynamics, Classical Optics, etc.</b>                                                                         |                  |
| New Relativistic Effects in the Dynamics of Nonlinear Hydrodynamical Waves .....                                                          | 114501           |
| Luciano Rezzolla and Olindo Zanotti                                                                                                       |                  |
| <b>Plasma and Beam Physics</b>                                                                                                            |                  |
| Ablation Effects on Weakly Nonlinear Rayleigh-Taylor Instability with a Finite Bandwidth .....                                            | 115001           |
| Tadashi Ikegawa and Katsunobu Nishihara                                                                                                   |                  |
| Interaction between Small-Scale Zonal Flows and Large-Scale Turbulence: A Theory for Ion Transport Intermittency in Tokamak Plasmas ..... | 115002           |
| Jiquan Li and Y. Kishimoto                                                                                                                |                  |
| Transparency of Magnetized Plasma at the Cyclotron Frequency .....                                                                        | 115003           |
| G. Shvets and J. S. Wurtele                                                                                                               |                  |

(Continued on Third Cover)

*Contents (Continued)*

|                                                                                                                                                                                                                          |        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Controlling the Profile of Ion-Cyclotron-Resonant Ions in JET with the Wave-Induced Pinch Effect .....                                                                                                                   | 115004 |
| M.J. Mantsinen, L.C. Ingesson, T. Johnson, V.G. Kiptily, M.-L. Mayoral, S.E. Sharapov, B. Alper,<br>L. Bertalot, S. Conroy, L.-G. Eriksson, T. Hellsten, J.-M. Noterdaeme, S. Popovichev, E. Righi, and<br>A.A. Tuccillo |        |
| <b>Condensed Matter: Structure, etc.</b>                                                                                                                                                                                 |        |
| Heat Capacity of $^3\text{He}$ in Aerogel .....                                                                                                                                                                          | 115301 |
| Jizhong He, A.D. Corwin, J.M. Parpia, and J.D. Reppy                                                                                                                                                                     |        |
| Nodal Effects in Dislocation Mobility .....                                                                                                                                                                              | 115501 |
| Vasily V. Bulatov and Wei Cai                                                                                                                                                                                            |        |
| Planar Defects and Incommensurate Phases in Highly Ordered Perovskite Solid Solutions .....                                                                                                                              | 115502 |
| Igor A. Kornev and L. Bellaiche                                                                                                                                                                                          |        |
| First-Principles Study of the Temperature-Pressure Phase Diagram of $\text{BaTiO}_3$ .....                                                                                                                               | 115503 |
| Jorge Íñiguez and David Vanderbilt                                                                                                                                                                                       |        |
| Spontaneous Decay of Excited Atomic States near a Carbon Nanotube .....                                                                                                                                                  | 115504 |
| I.V. Bondarev, G.Ya. Slepyan, and S.A. Maksimenko                                                                                                                                                                        |        |
| Hydrogen-Bond Dynamics near a Micellar Surface: Origin of the Universal Slow Relaxation at Complex Aqueous<br>Interfaces .....                                                                                           | 115505 |
| Sundaram Balasubramanian, Subrata Pal, and Biman Bagchi                                                                                                                                                                  |        |
| Observation of Acoustical Memory in $\text{LiNbO}_3$ .....                                                                                                                                                               | 115506 |
| Michael S. McPherson, Igor Ostrovskii, and M.A. Breazeale                                                                                                                                                                |        |
| Exact Solution of a Drop-Push Model for Percolation .....                                                                                                                                                                | 115701 |
| Satya N. Majumdar and David S. Dean                                                                                                                                                                                      |        |
| Existence and Nature of a Freezing Transition inside Three-Dimensional Arrays of Narrow Channels .....                                                                                                                   | 115702 |
| Carlo Carraro                                                                                                                                                                                                            |        |
| Role of Long Range Interaction in Oxygen Superstructure Formation on $\text{Cu}(001)$ and $\text{Ni}(001)$ .....                                                                                                         | 116101 |
| Sergey Stolbov and Talat S. Rahman                                                                                                                                                                                       |        |
| Arsenic Flux Dependence of Island Nucleation on $\text{InAs}(001)$ .....                                                                                                                                                 | 116102 |
| Frank Grosse, William Barvosa-Carter, Jenna Zinck, Matthew Wheeler, and Mark F. Gyure                                                                                                                                    |        |
| <b>Condensed Matter: Electronic Properties, etc.</b>                                                                                                                                                                     |        |
| Resonating-Valence-Bond States and Ferromagnetic Correlations in the Doped Triangular Mott Insulator .....                                                                                                               | 116401 |
| Takashi Koretsune and Masao Ogata                                                                                                                                                                                        |        |
| Berry-Phase Calculation of Magnetic Screening and Rotational $g$ Factor in Molecules and Solids .....                                                                                                                    | 116402 |
| Davide Ceresoli and Erio Tosatti                                                                                                                                                                                         |        |
| Semiclassical Theory of Spin-Orbit Interactions using Spin Coherent States .....                                                                                                                                         | 116601 |
| M. Pletyukhov, Ch. Amann, M. Mehta, and M. Brack                                                                                                                                                                         |        |
| Reversible Quantum Brownian Heat Engines for Electrons .....                                                                                                                                                             | 116801 |
| T.E. Humphrey, R. Newbury, R.P. Taylor, and H. Linke                                                                                                                                                                     |        |
| Phase Diagram of Interacting Composite Fermions in the Bilayer $\nu = 2/3$ Quantum Hall Effect .....                                                                                                                     | 116802 |
| N. Kumada, D. Terasawa, Y. Shimoda, H. Azuhata, A. Sawada, Z.F. Ezawa, K. Muraki, T. Saku, and<br>Y. Hirayama                                                                                                            |        |
| Non-Fermi-Liquid Behavior in $\text{Sr}_2\text{RuO}_4$ with Nonmagnetic Impurities .....                                                                                                                                 | 117001 |
| Naoki Kikugawa and Yoshiteru Maeno                                                                                                                                                                                       |        |
| Integral Equation Generates High-Temperature Expansion of the Heisenberg Chain .....                                                                                                                                     | 117201 |
| Masahiro Shiroishi and Minoru Takahashi                                                                                                                                                                                  |        |
| Phase Diagram of the Random Heisenberg Antiferromagnetic Spin-1 Chain .....                                                                                                                                              | 117202 |
| Andreia Saguia, Beatriz Boechat, and Mucio A. Continentino                                                                                                                                                               |        |
| Mott Domains of Bosons Confined on Optical Lattices .....                                                                                                                                                                | 117203 |
| G.G. Batrouni, V. Rousseau, R.T. Scalettar, M. Rigol, A. Muramatsu, P.J.H. Denteneer, and M. Troyer                                                                                                                      |        |
| Surface-Enhanced Emission from Single Semiconductor Nanocrystals .....                                                                                                                                                   | 117401 |
| K.T. Shimizu, W.K. Woo, B.R. Fisher, H.J. Eisler, and M.G. Bawendi                                                                                                                                                       |        |
| Time-Resolved Charge Carrier Generation from Higher Lying Excited States in Conjugated Polymers .....                                                                                                                    | 117402 |
| C. Gadermaier, G. Cerullo, G. Sansone, G. Leising, U. Scherf, and G. Lanzani                                                                                                                                             |        |

*(Continued on Preceding Page)*

## Contents (Continued)

|                                                                                                                                                 |        |
|-------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Dielectric Constants of Zr Silicates: A First-Principles Study .....                                                                            | 117601 |
| G.-M. Rignanese, F. Detraux, X. Gonze, Angelo Bongiorno, and Alfredo Pasquarello                                                                |        |
| First-Principles Approach to Insulators in Finite Electric Fields .....                                                                         | 117602 |
| Ivo Souza, Jorge Íñiguez, and David Vanderbilt                                                                                                  |        |
| <b>Interdisciplinary Physics: Biological Physics, Quantum Information, etc.</b>                                                                 |        |
| Rabi Oscillations in a Large Josephson-Junction Qubit .....                                                                                     | 117901 |
| John M. Martinis, S. Nam, J. Aumentado, and C. Urbina                                                                                           |        |
| Phase Transitions and Volunteering in Spatial Public Goods Games .....                                                                          | 118101 |
| György Szabó and Christoph Hauert                                                                                                               |        |
| Periodic Chirality Transformations Propagating On Bacterial Flagella .....                                                                      | 118102 |
| Daniel Coombs, Greg Huber, John O. Kessler, and Raymond E. Goldstein                                                                            |        |
| <b>Comments</b>                                                                                                                                 |        |
| Comment on “Molecular Dynamics Study of Melting and fcc-bcc Transitions in Xe” .....                                                            | 119601 |
| V. V. Kechin                                                                                                                                    |        |
| Belonoshko, Ahuja, and Johansson Reply .....                                                                                                    | 119602 |
| A. B. Belonoshko, R. Ahuja, and B. Johansson                                                                                                    |        |
| <b>Errata</b>                                                                                                                                   |        |
| Publisher’s Note: Strain-Induced Quantum Ring Hole States in a Gated Vertical Quantum Dot<br>[Phys. Rev. Lett. <b>89</b> , 096804 (2002)] ..... | 119901 |
| Jun Liu, A. Zaslavsky, and L. B. Freund                                                                                                         |        |