

# PHYSICAL REVIEW D<sub>TM</sub>

## PARTICLES, FIELDS, GRAVITATION, AND COSMOLOGY

### Editors

ERICK J. WEINBERG D. L. NORDSTROM

### Associate Editors

URS M. HELLER ROBERT D. PISARSKI

### Senior Assistant Editor

RASHMI RAY

### Assistant Editors

ANSAR FAYYAZUDDIN ALIN TIRZIU

### Senior Editorial Assistant

MARIA POKO

### Term ending 31 December 2012

ANDREAS ALBRECHT  
STEVEN DETWEILER  
DAM THANH SON

### Term ending 31 December 2013

PATRICIA R. BURCHAT  
DAVID GARFINKLE  
MARKUS A. LUTY  
RENAUD PARENTANI

### Term ending 31 December 2014

SINYA AOKI  
STEVEN CARLIP

### American Physical Society

#### Officers

*President* ROBERT L. BYER  
*President-Elect* MICHAEL S. TURNER  
*Vice-President* MALCOLM R. BEASLEY  
*Past President* BARRY C. BARISH  
*Editor in Chief* GENE D. SPROUSE  
*Treasurer and Publisher* JOSEPH W. SERENE  
*Executive Officer* KATE P. KIRBY

One Physics Ellipse  
College Park, MD 20740-3844

### APS Editorial Office

#### Directors

*Editorial* DANIEL T. KULP  
*Journal Information Systems* MARK D. DOYLE  
*Journal Operations* CHRISTINE M. GIACCONE

1 Research Road  
Ridge, NY 11961-2701  
Phone: (631) 591-4040 Fax: (631) 591-4141  
Email: prd@aps.org  
Web: <http://publish.aps.org/>  
Submissions: prdtx@aps.org or  
<http://authors.aps.org/ESUB/>

### Member Subscriptions:

#### APS Membership Department

One Physics Ellipse  
College Park, MD 20740-3844  
Phone: (301) 209-3280 Fax: (301) 209-0867  
Email: membership@aps.org

### Institutional Subscriptions:

#### APS Subscription Services

Suite 1N01  
2 Huntington Quadrangle  
Melville, NY 11747-4502  
Toll free: (800) 344-6902  
Phone: (516) 576-2270 Fax: (516) 349-9704  
Email: subs@aps.org

**Manuscripts** should be submitted electronically in acceptable format (see <http://authors.aps.org/ESUB/> or inquire at prdtx@aps.org). If this is not possible, send one copy to the Editorial Office. Submission is a representation that the manuscript has not been published previously and is not currently under consideration for publication elsewhere. Authors should provide indexing codes according to the PACS scheme (available at <http://publish.aps.org/PACS/>). An executed APS **copyright-transfer** form must be provided (effective only on acceptance for publication); the form is available via our Web submission server and via <http://authors.aps.org/>. Information for contributors may be found on our Web server or in the January and July issues.

To help defray editorial and production expenses, authors of manuscripts which are not submitted in acceptable electronic format are expected to pay a **publication charge** of \$1325/article, \$825/Rapid Communication or Brief Report, \$300/Comment or Reply. Acceptable formats are REV<sub>T</sub><sub>E</sub>X (preferred), L<sub>T</sub><sub>E</sub>X, plain T<sub>E</sub>X; MS Word; PostScript figures (preferred). **Reprints** are offered for sale to authors.

For information about **subscription prices** and about the **online version** of the journal, see our Web server, or inquire at assocpub@aps.org. **Member** inquiries regarding **subscriptions**, renewals, address changes, missing or damaged copies, and single-copy orders should be addressed to the APS Membership Department. **Institutional subscribers** should address subscription inquiries to APS Subscription Services. For address changes please send both old and new addresses, and if possible, send the mailing label from a recent issue.

**Copyright © 2012 American Physical Society. All rights reserved.**  
Physical Review D<sub>TM</sub> is a trademark of the American Physical Society.

**Rights and Permissions:** See <http://publish.aps.org/copyrightFAQ.html>.

**Copying:** No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the written permission of the publisher, except as stated below. Single copies of individual articles may be made for private use or research. Authorization is given to copy articles beyond the use permitted by Sections 107 and 108 of the U.S. Copyright Law, provided the copying fee of \$25.00 per copy per article is paid to the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, USA.

**Reproduction** of an entire Article in a reprint collection, or for advertising or promotional purposes, or republication in any form requires permission from APS. Permission must be sought from the Associate Publisher, American Physical Society, One Physics Ellipse, College Park, MD 20740-3844; email: assocpub@aps.org.

**Other Use:** Permission is granted to quote from the journal with the customary acknowledgment of the source. Permission must be sought from the APS Associate Publisher to reproduce a figure, table, or excerpt of an Article. Authorization for private use or research does not extend to systematic or multiple reproduction, to copying for promotional purposes, to distribution in any format, or to republication in any form. In all such cases, specific permission from APS must be obtained.

**Physical Review D<sub>TM</sub> Particles, Fields, Gravitation, and Cosmology [ISSN: 1550-7998 (print), 1550-2368 (online); CODEN PRVDAQ; printed in USA] is published twice a month by the American Physical Society, 1 Research Road, Ridge, NY 11961-2701.**

**POSTMASTER:** Send address changes to Physical Review D<sub>TM</sub>, APS Subscription Services, Suite 1N01, 2 Huntington Quadrangle, Melville, NY 11747-4502. The 2012 print + online base price is \$4520. Periodicals postage rates are paid at Huntington Station, NY, and additional mailing offices.