

# PHYSICAL REVIEW D

covering particles, fields, gravitation, and cosmology

*Lead Editor*      *Managing Editor*  
MIRJAM CVETIČ      URS M. HELLER

*Associate Editors*  
ANSAR FAYYAZUDDIN      ROBERT D. PISARSKI      ENRICO RAMIREZ-RUIZ      RASHMI RAY  
JOSHUA SAYRE      ALIN TIRZIU      PANAYIOTIS TZANAVARIS      ROBERT WIMMER

*Senior Editorial Assistant*  
MARIA POKO

## EDITORIAL BOARD

*Term ending 31 December 2022*

MARTIN BOJOWALD  
NATHANIEL CRAIG  
LAURA REINA  
BERNARD F. WHITING

*Term ending 31 December 2023*

OFER AHARONY  
CLAUDE DUHR  
GARY HOROWITZ  
PATRICIA L. MCBRIDE  
ERIC POISSON

*Term ending 31 December 2024*

MANUELA CAMPANELLI  
ALEKSEY CHERMAN  
JAMES M. CLINE  
SCOTT A. HUGHES  
DANIEL KASEN  
SAMAYA M. NISSANKE

## American Physical Society

*President*      FRANCES HELLMAN  
*Speaker of the Council*      ROBIN L.B. SELINGER  
*Chief Executive Officer*      JONATHAN A. BAGGER  
*Editor in Chief*      MICHAEL THOENNESSEN  
*Acting Publisher*      JEFF LEWANDOWSKI  
*Chief Information Officer*      MARK D. DOYLE  
*Chief Finance and Operations Officer*      JANE HOPKINS GOULD  
*Chief Government Affairs Officer*      FRANCIS SLAKEY  
*Chief Human Resources Officer*      BETH GUNZEL

One Physics Ellipse  
College Park, MD 20740-3844

## APS Editorial Office

*Executive Editor*      JESSICA THOMAS  
*Director, Journal Operations*      CHRISTINE M. GIACCONE  
1 Research Road  
Ridge, NY 11961-2701  
Phone: (631) 591-4040  
Email: prd@aps.org  
Web: <https://journals.aps.org/>  
Submissions: <https://authors.aps.org/Submissions/>

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](mailto:membership@aps.org)

Institutional Subscriptions:

**APS Subscription Services**  
P.O. Box 41  
Annapolis Junction, MD 20701  
Toll free: (888) 339-9655  
Phone: (301) 617-7809      Email: [subs@aps.org](mailto:subs@aps.org)

**Manuscripts** should be **submitted** electronically in acceptable format (see <https://authors.aps.org/Submissions/>). Submission is a representation that the manuscript has not been published previously and is not currently under consideration for publication elsewhere. An executed APS **copyright-transfer** form must be provided (effective only on acceptance for publication) unless open access publication is required and the appropriate OA fees paid. Information for Contributors and a description of editorial Policies and Practices can be found at <https://journals.aps.org/prd/authors>.

Acceptable formats are REV<sub>T</sub>EX (preferred), L<sup>A</sup>T<sub>E</sub>X, MS Word; PostScript figures are preferred. **Reprints** are offered for sale to authors.

For additional information regarding the online version of this journal, please visit: <https://journals.aps.org/prd>. Institutional subscribers requesting address changes, filing claims, or requesting additional information, please contact the APS Services at [subs@aps.org](mailto:subs@aps.org). Member subscribers requiring changes, claims or additional information should contact the APS Membership Department at [membership@aps.org](mailto:membership@aps.org).

**Copyright © 2022 American Physical Society. All rights reserved.**

*Physical Review D*<sup>TM</sup> is a trademark of the American Physical Society, registered in the United States, Canada, European Union and Japan.

**Rights and Permissions:** <https://journals.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 via Aptara's SciPris<sup>TM</sup> platform. To request permission to republish, refer to the Reuse and Permissions link that can be found (online) on each APS article page and provide the requested information.

**Other Use:** Permission is granted to quote from the journal with the customary acknowledgment of the source. Permission must be sought using Aptara's SciPris<sup>TM</sup> platform. To request permission to reproduce a figure, table, or excerpt of an article refer to the Reuse and Permissions link that can be found on each APS article page and provide the requested information. 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* Particles, Fields, Gravitation, and Cosmology [ISSN: 2470-0010 (print), 2470-0029 (online); CODEN PRVDAQ; printed in USA] is published twice a month by the American Physical Society, 1 Research Road, Ridge, NY 11961-2701.