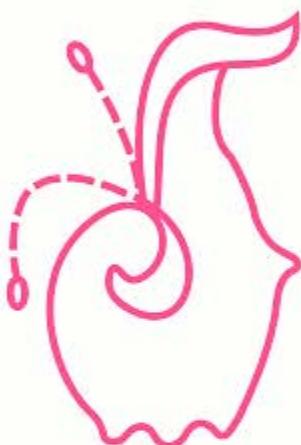


# REVISTA MEXICANA DE FÍSICA

PUBLICACIÓN BIMESTRAL  
DE LA SOCIEDAD  
MEXICANA DE FÍSICA



<https://rmf.smf.mx/ojs/rmf>

ISSN: 0035-001X  
e-ISSN: IN PROCESS

Volume 65  
ISSUE 4  
JULY-AUGUST  
2019

**Chief Editor:**

Alejandro Ayala

Instituto de Ciencias Nucleares, UNAM, México

**Editorial Board****Atomic and Molecular Physics:**

Rocío Jáuregui

Instituto de Física, UNAM, México

**Condensed Matter:**

Alejandro Gil-Villegas Montiel

DCI-Campus León, Universidad de Guanajuato, México

Enrique Muñoz Tavera

Departamento de Física, Pontificia Universidad Católica de Chile, Chile

**Fluid Dynamics:**

Máximo Pliego Díaz

Instituto Tecnológico de Querétaro, México

Sergio Cuevas García

Instituto de Energías Renovables, UNAM, México

**Gravitation, Mathematical Physics and Field Theory:**

Luis Fernando Urrutia

Instituto de Ciencias Nucleares, UNAM, México

**High Energy Physics:**

María Elena Tejeda-Yeomans

Universidad de Colima, Facultad de Ciencias-CUICBAS, México

**Instrumentation:**

Luis Manuel Montaño

Departamento de Física, Cinvestav-CDMX

**Medical Physics:**

Mercedes Rodríguez

Instituto de Física, UNAM, México

**Nuclear Physics:**

Ivano Lombardo

INFN - Sezione di Catania, Italy

Larry McLerran

Institute for Nuclear Theory, University of Washington, Seattle, USA

Norberto Scoccola

Comisión Nacional de Energía Atómica, Argentina

**Optics:**

Héctor Manuel Moya Cessa

Instituto Nacional de Astrofísica, Óptica y Electrónica, México

Carlos Treviño

Instituto Nacional de Astrofísica, Óptica y Electrónica, México

**Plasma Physics:**

Julio Herrera

Instituto de Ciencias Nucleares, UNAM, México.

**Solid State Physics:**

Oracio Navarro

Instituto de Investigaciones en Materiales, UNAM, Campus Morelia, México.

**Thermodynamics and Statistical Physics:**

Héctor Dominguez

Instituto de Investigaciones en Materiales, UNAM, México

**Secretary:**

María Magdalena López Reynoso

Sociedad Mexicana de Física

**Technical Staff:**

Efraín R. Garrido Román

Sociedad Mexicana de Física

Víctor Maya Higuera

Sociedad Mexicana de Física

**Copyeditors:**

Dr. Saúl Hernández Ortiz

Dr. Brenda Carballo Pérez

REVISTA MEXICANA DE FÍSICA, year 65, issue 4, July-August 2019. Bimonthly Journal published by Sociedad Mexicana de Física, A.C. Departamento de Física, 2º Piso, Facultad de Ciencias, Universidad Nacional Autónoma de México, Ciudad Universitaria, Alcaldía Coyacán, C.P. 04510 , Ciudad de México. Apartado Postal 70-348. Tel. (+52 55)5622-4946, <https://www.smf.mx/>, <https://rmf.smf.mx/ojs/>, [rmf@ciencias.unam.mx](mailto:rmf@ciencias.unam.mx). Responsible Editor: José Alejandro Ayala Mercado. Copy Rights exclusive use of the title No. 04-2013-070116484400-102, ISSN: 0035-001X, both granted by Instituto Nacional del Derecho de Autor. Legal Titled No. 3110, Legal Content No. 2775, granted by Comisión Calificadora de Publicaciones y Revistas Ilustradas of Secretaría de Gobernación. SEPOMEX permit, in process. Printed by Reproducciones Gráficas del Sur, S.A. de C.V., Amatl No. 20, Col. Santo Domingo, Alcaldía Coyoacán, C.P. 04369, Ciudad de México, Tel.: 5619-4088. This issue was printed on June 30, 2019 with a print run of 150 copies.

Revista Mexicana de Física is published with the sponsorship of: Consejo Nacional de Ciencia y Tecnología, and Universidad Nacional Autónoma de México through Rectoría, Facultad de Ciencias, Instituto de Astronomía, Instituto de Ciencias Nucleares, Instituto de Investigaciones en Materiales e Instituto de Física.

Indexed in: Actualidad Iberoamericana, Astron. & Astrophys. Abstr., Bull. Signal., Chem. Abstr., Curr. Cont., Curr. Math. Pub., Curr. Pap. Phys., Electr. & Electron. Abstr., INIS Atomind., Journal Citation Reports (JCR), Math. Sci., LatIndex, Math. Rev., Nucl. Sci. Abstr., PERIODICA, Phys. Abstr., Phys. Ber., Res. Alert, Sci. Abstr., Sci. Cit. Ind., SciSearch y SciELO Cit. Ind. Included in the Revistas Mexicanas de Investigación Científica y Tecnológica del Consejo Nacional de Ciencia y Tecnología (CONACyT).

Instructions for authors are published in <https://rmf.smf.mx/ojs/rmf/about/submissions#authorGuidelines>. The cost of the annual subscription is of \$1300.00 MXN for subscribers within Mexico, \$230 USD for Central and North America and \$235 USD for the rest of world. Price of each individual copy is \$170.00 MXN.

The partial or total reproduction of its contents is authorized citing the source: Revista Mexicana de Física or Rev. Mex. Fis. Signed articles are the responsibility of the authors.

Cover design: Arte Gráfico, Sur 71 No. 501, Col. Justo Sierra, 09460, Ciudad de México.

# REVISTA MEXICANA DE FÍSICA

VOLUME 65  
ISSUE 4  
JULY -  
AUGUST  
2019

## CONTENTS

### □ Reviews

- Multi-TeV flaring in nearby high energy blazars: A photohadronic scenario,  
SARIRA SAHU

307-320

### □ Research

#### Atomic and Molecular Physics

- Polymer weight determination from numerical and experimental data of the  
reduced viscosity of polymer in brine,  
A.I VEGA-PAZ, F. DE J. GUEVARA-RODRÍGUEZ, J. F. PALOMEQUE-SANTIAGO,  
AND N. VICTOROVNA LIKHANOVA

321-327

- Approach by Raman and infrared spectroscopy in three vegetable oils  
from the Brazilian Amazon,

Q.S. MARTINS, C.A. AGUIRRE AND J.L.B. FARIA

328–332

- Any  $l$ -state solutions of the Schrödinger equation for  $q$ -deformed Hulthen  
plus generalized inverse quadratic Yukawa potential in arbitrary dimensions,  
C.O. EDET AND P.O. OKOI

333-344

#### Condensed Matter

- Deposit of AlN thin films by nitrogen reactive pulsed laser ablation  
using an Al target,

F. CHALE-LARA, M. ZAPATA-TORRES, F. CABALLERO-BRIONES, W. DE LA CRUZ,  
N. CRUZ GONZÁLEZ, C. HUERTA-ESCAMILLA, AND M.H. FARÍAS

345–350

- Effect of foaming agent on the mechanical properties of sulfur and peroxide  
cured ethylene propylene diene monomer rubbers,

H.H. HASSAN, A.H. AL-DARDIR, J.A. KHALIEL, H.S. AYOUB,  
S.A. KHAIRY, E.M. ABDEL BARYA AND Y.H. ELBASHAR

351–354

- Synthesis and crystal structure of the quaternary semiconductor  
 $\text{Cu}_2\text{NiGeS}_4$ , a new stannite-type compound,  
G.E. DELGADO AND V. SAGREDO

355–359

*continued*

**On the crystal structure of the ordered vacancy compound Cu<sub>3</sub>In<sub>5</sub>Te<sub>9</sub>,**

G.E. DELGADO, C. RINCÓN, AND G. MARROQUÍN

360-364

**Fluid Dynamics****Lattice Boltzmann method modeling of magnetic water-based nanofluid through a permeable three-dimensional enclosure,**

M. SHEIKHOLESLAMI, S.A. SHEHZAD, AHMAD SHAFEE, F.M. ABBASI

R. KANDASAMY, AND ZHIXIONG LII

365-372

**Heat transfer augmentation in water-based TiO<sub>2</sub> nanoparticles through a converging/diverging channel by considering Darcy-Forchheimer porosity,**

K. GANESH KUMAR, S.A. SHEHZAD, T. AMBREEN, AND M.I. ANWAR

373-381

**Gravitation, Mathematical Physics and Field Theory****A charged perfect fluid model with high compactness,**

G. ESTEVEZ-DELGADO, J. ESTEVEZ-DELGADO, M. PINEDA DURAN,

N. MONTELONGO GARCÍA AND J.M. PAULIN-FUENTES

382-391

**A model for low mass compact objects,**

G. ESTEVEZ-DELGADO, J. ESTEVEZ-DELGADO AND J.M. PAULIN-FUENTES

392-397

**On the noncommutative energy level in a two-dimensional anharmonic oscillator,**

G. FARÍAS, E.A. MENA-BARBOZA AND S. RODRÍGUEZ

398-403

**Nuclear Physics****Microscopic analysis of elastic scattering cross sections for different densities of <sup>8</sup>Li nucleus on light, medium and heavy mass targets,**

M. AYGUN AND Z. AYGUN

404-411

**Other areas in Physics****The pairwise quantum correlations for teleported state via a symmetric multi-qubit system,**

S. AHADPOUR AND F. MIRMASOUDI

412-418