

# 物 理 学 报

第 73 卷 第 4 期 2024 年 2 月 20 日

## 目 次

### 数据论文

044207  $\text{Nd}^{3+}:\text{GdScO}_3$  晶体场能级及拟合分析 ..... 樊颖 张庆礼 高进云 高宇茜 黄磊 刘耀

### 总论

040201 椭圆函数背景下 Gerdjikov-Ivanov 方程的多呼吸子 ..... 姚慧 张海强 熊玮玥

040301 一维超冷原子动量光晶格中的手征对称性破缺拓扑相 .....  
..... 曾超 毛一屹 吴骥宙 苑涛 戴汉宁 陈宇翔

040302 哈密顿量宇称-时间对称性的刻画 ..... 张慧洁 贺衍

040303 基于 Rényi- $\alpha$  熵的参数化纠缠度量 ..... 戴伟鹏 贺衍 侯晋川

040304 多逻辑比特表面码结构设计及其逻辑 CNOT 门实现 ..... 权东晓 吕晓杰 张雯菲

040401 Einstein-Bumblebee 引力理论中的 Kerr-Sen-like 黑洞玻色子隧穿辐射 ..... 谭霞 杨树政

040501 量子信息中的度量空间方法在准周期系统中的应用 ..... 冯曦曦 陈文 高先龙

040502 基于格子 Boltzmann 方法的钉扎螺旋波反馈控制 ..... 赖瑶瑶 陈鑫梦 柴振华 施保昌

040503 基于改进强耦合振子的微弱脉冲信号检测方法 ..... 李远芳 姜园 赵磊

040701 基于超快激光调制的纳秒脉冲 X 射线发射源 .....  
..... 李昀 苏桐 盛立志 张蕊利 刘舵 刘永安 强鹏飞 杨向辉 许泽方

### 核物理学

042101 双  $\Lambda$  超核同位旋标量巨共振性质的相对论研究 ..... 温静 孙帅 曹李刚 张丰收

042801 结合源偏倚和权窗的蒙特卡罗全局减方差方法 ..... 张显 刘仕倡 魏军侠 李树 王鑫 上官丹骅

### 原子和分子物理学

043101 五氟吡啶激发态非绝热弛豫过程中的分子结构 ..... 李多多 张嵩

043102 单空位缺陷对二维  $\delta\text{-InSe}$  稳定性的影响 ..... 苗瑞霞 王业飞 谢妙春 张德栋

043201 类氦 C 离子诱发不同金属厚靶原子的 K-X 射线 .....  
..... 梅策香 张小安 周贤明 梁昌慧 曾利霞 张艳宁 杜树斌 郭义盼 杨治虎

### 电磁学、光学、声学、传热学、经典力学和流体动力学

044101 极紫外光源及高荷态离子诱导下甲烷的脱氢通道碎裂机制 .....  
..... 骆炎 余璇 雷建廷 陶琛玉 张少锋 朱小龙 马新文 闫顺成 赵晓辉

044201 双振荡场产生正负电子对的理论研究 ..... 李传可 林南省 周鲜鲜 江森 李英骏

044202 点间隧穿耦合对四能级三量子点电磁感应透明介质孤子动力学的影响 .....  
..... 王胤 王壬颖 陈桥 邓永和

044203 一维耦合腔晶格中磁子-光子拓扑相变和拓扑量子态的调制 ..... 李锦芳 何东山 王一平

044204 基于锁模光学频率梳的高速数据传输 ..... 刘琪华 梅佳雪 王金栋 张福民 曲兴华

044205  $2.94\ \mu\text{m}$   $\text{LiNbO}_3$  声光调 Q Er:YAG 激光输出脉冲特性 ..... 王滔宁 姜玲玲 程庭清 王礼 江海河

- 044206 基于台阶声光调  $Q$  外腔泵浦 MgO:PPLN 光参量振荡器的  $3.4\ \mu\text{m}$  中红外脉冲串激光器 ..... 姚晓岱 吴爽 赵锐 吴森鑫 刘航 金光勇 于永吉
- 044301 SiGe BiCMOS 低噪声放大器激光单粒子效应研究 ..... 李培 董志勇 郭红霞 张凤祁 郭亚鑫 彭冶钢 贺朝会

### 气体、等离子体和放电物理

- 045201 带有射频偏压源的感性耦合 Ar/O<sub>2</sub>/Cl<sub>2</sub> 等离子体放电的混合模拟研究 ..... 佟磊 赵明亮 张钰如 宋远红 王友年

### 凝聚物质: 结构、力学和热学性质

- 046101 不同力学激励形式探索 La 基非晶合金微观结构非均匀性 ..... 张剑 郝奇 张浪滢 乔吉超
- 046501 LLM-105 的分子间相互作用和热力学性质 ..... 范俊宇 高楠 王鹏举 苏艳
- 046801 具有多 MO 喷嘴垂直 MOCVD 反应腔外延层厚度均匀性的优化理论及应用 ..... 李建军 崔屿峥 付聪乐 秦晓伟 李雨畅 邓军

### 凝聚物质: 电子结构、电学、磁学和光学性质

- 047101 基于形变势理论的掺杂计算 Sb<sub>2</sub>Se<sub>3</sub> 空穴迁移率 ..... 张冷 张鹏展 刘飞 李方政 罗毅 侯纪伟 吴孔平
- 047801 基于 BCPO 发光材料近紫外有机发光二极管的电致发光效率与稳定性 ..... 任兴 于宏宇 张勇
- 047802 基于准连续域束缚态的全介质超构表面双参数传感器 ..... 刘会刚 张翔宇 南雪莹 赵二刚 刘海涛
- 047803 Bi<sub>2</sub>O<sub>2</sub>Se 纳米线的生长及其超导量子干涉器件 ..... 刘怀远 肖建飞 吕昭征 吕力 屈凡明
- 047901 非晶态碳薄膜对金属二次电子发射的影响 ..... 胡笑钊 刘样溪 楚坤 段潮锋

### 物理学交叉学科及有关科学技术领域

- 048701 p53 活性四聚体全原子分子动力学分析 **封面文章** ..... 周晗 耿轶钊 晏世伟
- 048901 识别高阶网络传播中最有影响力的节点 ..... 李江 刘影 王伟 周涛

文章图片的彩色效果详见网刊



扫码阅读  
电子版

# ACTA PHYSICA SINICA

Vol. 73, No. 4, February 20, 2024

## CONTENTS

### DATA PAPERS

- 044207 Nd<sup>3+</sup>:GdScO<sub>3</sub> crystal field energy level and fitting  
*Fan Ying Zhang Qing-Li Gao Jin-Yun Gao Yu-Xi Huang Lei Liu Yao*

### GENERAL

- 040201 Breathers of Gerdjikov-Ivanov equation under background of elliptic function  
*Yao Hui Zhang Hai-Qiang Xiong Wei-Yue*
- 040301 Topological phase in one-dimensional momentum space lattice of ultracold atoms without chiral symmetry  
*Zeng Chao Mao Yi-Yi Wu Ji-Zhou Yuan Tao Dai Han-Ning Chen Yu-Ao*
- 040302 Depiction of Hamiltonian PT-symmetry  
*Zhang Hui-Jie He Kan*
- 040303 Parameterized entanglement measures based on Rényi- $\alpha$  entropy  
*Dai Wei-Peng He Kan Hou Jin-Chuan*
- 040304 Structure design and logical CNOT implementation of multi-logical-qubits surface code  
*Quan Dong-Xiao Lü Xiao-Jie Zhang Wen-Fei*
- 040401 Tunneling radiation of bosons from the Kerr-Sen-like black hole by Einstein-Bumblebee gravitational theory  
*Tan Xia Yang Shu-Zheng*
- 040501 Application of metric space method in quantum information in quasi-periodic systems  
*Feng Xi-Xi Chen Wen Gao Xian-Long*
- 040502 Lattice Boltzmann method based feedback control approach for pinned spiral waves  
*Lai Yao-Yao Chen Xin-Meng Chai Zhen-Hua Shi Bao-Chang*
- 040503 Weak pulse signal detection method based on improved strongly coupled oscillators  
*Li Yuan-Fang Jiang Yuan Zhao Lei*
- 040701 Nanosecond pulse X-ray emission source based on ultrafast laser modulation  
*Li Yun Su Tong Sheng Li-Zhi Zhang Rui-Li Liu Duo Liu Yong-An Qiang Peng-Fei Yang Xiang-Hui Xu Ze-Fang*

### NUCLEAR PHYSICS

- 042101 Isoscalar giant resonances of  $^{18}_{\Lambda\Lambda}\text{O}$  in relativistic approach  
*Wen Jing Sun Shuai Cao Li-Gang Zhang Feng-Shou*
- 042801 Monte Carlo global variance reduction method combining source bias and weight window  
*Zhang Xian Liu Shi-Chang Wei Jun-Xia Li Shu Wang Xin Shangguan Dan-Hua*

### ATOMIC AND MOLECULAR PHYSICS

- 043101 Molecular structures in the non-adiabatic relaxation processes of excited states of pentafluoropyridine  
*Li Duo-Duo Zhang Song*
- 043102 Effect of single vacancy defects on two-dimensional  $\delta$ -InSe stability  
*Miao Rui-Xia Wang Ye-Fei Xie Miao-Chun Zhang De-Dong*
- 043201 K-X rays induced by helium-like C ions in thick target atoms of different metals  
*Mei Ce-Xiang Zhang Xiao-An Zhou Xian-Ming Liang Chang-Hui Zeng Li-Xia Zhang Yan-Ning Du Shu-Bin Guo Yi-Pan Yang Zhi-Hu*

(Continued)

ELECTROMAGNETISM, OPTICS, ACOUSTICS, HEAT TRANSFER,  
CLASSICAL MECHANICS, AND FLUID DYNAMICS

- 044101 Fragmentation mechanism of methane dehydrogenation channel induced by extreme ultraviolet and high charge ions  
*Luo Yan Yu Xuan Lei Jian-Ting Tao Chen-Yu Zhang Shao-Feng Zhu Xiao-Long Ma Xin-Wen Yan Shun-Cheng Zhao Xiao-Hui*
- 044201 Theoretical study of double oscillating fields induced electron-positron pairs creation process  
*Li Chuan-Ke Lin Nan-Sheng Zhou Xian-Xian Jiang Miao Li Ying-Jun*
- 044202 Effect of inter-dot tunneling coupling on soliton dynamical behaviors in four-level triple quantum dot EIT medium  
*Wang Yin Wang Ren-Ying Chen Qiao Deng Yong-He*
- 044203 Modulation of topological phase transition and topological quantum state of magnon-photon in one-dimensional coupled cavity lattices  
*Li Jin-Fang He Dong-Shan Wang Yi-Ping*
- 044204 High-speed data transmission based on mode-locked optical frequency comb  
*Liu Qi-Hua Mei Jia-Xue Wang Jin-Dong Zhang Fu-Min Qu Xing-Hua*
- 044205 LiNbO<sub>3</sub> acousto-optically *Q*-switched pulse characteristics of Er:YAG laser at 2.94 μm  
*Wang Tao-Ning Jiang Ling-Ling Cheng Ting-Qing Wang Li Jiang Hai-He*
- 044206 3.4 μm mid-infrared pulse train laser based on stepped acousto-optic *Q*-switched external cavity pumped MgO:PPLN optical parametric oscillator  
*Yao Xiao-Dai Wu Shuang Zhao Rui Wu Miao-Xin Liu Hang Jin Guang-Yong Yu Yong-Ji*
- 044301 Investigation of laser-induced single event effect on SiGe BiCMOS low noise amplifiers  
*Li Pei Dong Zhi-Yong Guo Hong-Xia Zhang Feng-Qi Guo Ya-Xin Peng Zhi-Gang He Chao-Hui*

PHYSICS OF GASES, PLASMAS, AND ELECTRIC DISCHARGES

- 045201 Hybrid simulation of radio frequency biased inductively coupled Ar/O<sub>2</sub>/Cl<sub>2</sub> plasmas  
*Tong Lei Zhao Ming-Liang Zhang Yu-Ru Song Yuan-Hong Wang You-Nian*

CONDENSED MATTER: STRUCTURAL, MECHANICAL, AND  
THERMAL PROPERTIES

- 046101 Probing microstructural heterogeneity of La-based amorphous alloy under versatile mechanical stimuli  
*Zhang Jian Hao Qi Zhang Lang-Ting Qiao Ji-Chao*
- 046501 Intermolecular interactions and thermodynamic properties of LLM-105  
*Fan Jun-Yu Gao Nan Wang Peng-Ju Su Yan*
- 046801 Optimization theory and application of epitaxial layer thickness uniformity in vertical MOCVD reaction chamber with multiple MO nozzles  
*Li Jian-Jun Cui Yu-Zheng Fu Cong-Le Qin Xiao-Wei Li Yu-Chang Deng Jun*

CONDENSED MATTER: ELECTRONIC STRUCTURE, ELECTRICAL,  
MAGNETIC, AND OPTICAL PROPERTIES

- 047101 Carrier mobility in doped Sb<sub>2</sub>Se<sub>3</sub> based on deformation potential theory  
*Zhang Leng Zhang Peng-Zhan Liu Fei Li Fang-Zheng Luo Yi Hou Ji-Wei Wu Kong-Ping*
- 047801 Electroluminescence efficiency and stability of near ultraviolet organic light-emitting diodes based on BCPO luminous materials  
*Ren Xing Yu Hong-Yu Zhang Yong*
- 047802 All-dielectric metasurface two-parameter sensor based on quasi-bound states in continuum  
*Liu Hui-Gang Zhang Xiang-Yu Nan Xue-Ying Zhao Er-Gang Liu Hai-Tao*

(Continued)

- 047803 Growth of Bi<sub>2</sub>O<sub>2</sub>Se nanowires and their superconducting quantum interference devices  
*Liu Huai-Yuan Xiao Jian-Fei Lü Zhao-Zheng Lü Li Qu Fan-Ming*
- 047901 Effect of amorphous carbon film on secondary electron emission of metal  
*Hu Xiao-Chuan Liu Yang-Xi Chu Kun Duan Chao-Feng*

INTERDISCIPLINARY PHYSICS AND RELATED AREAS OF SCIENCE  
AND TECHNOLOGY

- 048701 Full-atomistic molecular dynamics analysis of p53 active tetramer **COVER ARTICLE**  
*Zhou Han Geng Yi-Zhao Yan Shi-Wei*
- 048901 Identifying influential nodes in spreading process in higher-order networks  
*Li Jiang Liu Ying Wang Wei Zhou Tao*

Color figures can be viewed in the online issue.



Online issue