

核技术 (英文版)

# NUCLEAR SCIENCE & TECHNIQUES

Vol.34 No.1 | January 2023

Nuclear Science and Techniques

VOLUME 34, ISSUE 1, JANUARY 2023



## MEGAHERTZ CAVITY ENHANCED X-RAY GENERATION (MING)

*A proposal for even brighter free electron lasers*



万方数据



Springer

# Nuclear Science and Techniques

Volume 34 • Issue 1 • January 2023

ISSN: 1001-8042 (Paper); CN 31-1559/TL

## VIEWPOINT AND RESEARCH HIGHLIGHT

- 15 **Vector meson spin alignment by the strong force field**  
X.-N. Wang
- 16 **New type of double-slit interference experiment at Fermi scale**  
Y.-G. Ma

## ACCELERATOR, RAY TECHNOLOGY AND APPLICATIONS

- 6 **The MING proposal at SHINE: megahertz cavity enhanced X-ray generation**  
N.-S. Huang · Z.-P. Liu · B.-J. Deng · Z.-H. Zhu · S.-H. Li · T. Liu · Z. Qi · J.-W. Yan · W. Zhang · S.-W. Xiang · Y.-Y. Lei · Y. Zhu · Y.-Z. He · Q.-B. Yuan · F. Gao · R.-B. Deng · S. Sun · Z.-D. Lei · Z.-Q. Jiang · M.-Q. Duan · Y. Zhuan · X.-F. Huang · P.-C. Dong · Z.-L. Li · S.-Y. Si · L. Xue · S. Chen · Y.-F. Liu · Y.-J. Tong · H.-X. Deng · Z.-T. Zhao
- 11 **Static superconducting gantry-based proton CT combined with X-ray CT as prior image for FLASH proton therapy**  
Y.-Q. Yang · W.-C. Fang · X.-X. Huang · J.-H. Tan · C. Wang · C.-P. Wang · Z.-T. Zhao
- 13 **Optimization method of Hadamard coding plate in  $\gamma$ -ray computational ghost imaging**  
Z. Zhou · S.-G. Li · Q.-S. Tan · L. Yang · M.-Z. Liu · M. Wang · L. Wang · Y. Cheng

## NUCLEAR ELECTRONICS AND INSTRUMENTATION

- 1 **Large area  $^3\text{He}$  tube array detector with modular design for multi-physics instrument at CSNS**  
L. Zhu · J.-R. Zhou · Y.-G. Xia · L. Xiao · H. Luo · X.-J. Zhou · W.-Q. Yang · B.-J. Guan · X.-F. Jiang · Y.-F. Wang · H. Xu · H.-Y. Teng · L.-X. Zeng · J.-J. Li · L. Hu · K. Zhou · Y.-X. Qiu · P.-X. Shen · J. Xu · L.-J. Liao · X.-Z. Wang · G.-A. Yang · H.-C. Chen · J.-P. Xu · Z.-D. Li · S.-L. Wang · J. Zhuang · Y.-B. Zhao · J.-R. Zhang · W. Yin · Z.-J. Sun · Y.-B. Chen
- 3 **Conceptual design of a  $\text{Cs}_2\text{LiLaBr}_6$  scintillator-based neutron total cross section spectrometer on the back-n beam line at CSNS**  
D.-J. Zhao · S. Feng · P.-J. Cheng · R. Liu · W. Luo · H.-Q. Wang · J.-M. Xue · K. Zhu · B. Zheng
- 8 **Performance of real-time neutron/gamma discrimination methods**  
S.-X. Liu · W. Zhang · Z.-H. Zhang · S. Lin · H.-R. Cao · C.-X. Song · J.-L. Zhao · G.-Q. Zhong
- 12 **Afterpulse measurement of JUNO 20-inch PMTs**  
R. Zhao · N. Anfimov · Y. Chen · H. Hu · J. Hu · X.-L. Ji · D. Korablev · M. Li · A. Olshevskiy · Z.-Y. Peng · A. Rybnikov · Z.-H. Qin · J. Wang · W. Wang · Z.-M. Wang · B. Wonsak

(Table of contents continued on inside back cover)



(Contents continued)

NUCLEAR PHYSICS AND INTERDISCIPLINARY RESEARCH

- 4 Measurement of  $^{134}\text{Xe}(n,2n)^{133\text{m,g}}\text{Xe}$  reaction cross sections in 14-MeV region with detailed uncertainty quantification**  
J.-H. Luo · J.-C. Liang · L. Jiang · F. Tuo · L. Zhou · L. He
- 5 The complex momentum representation approach and its application to low-lying resonances in  $^{17}\text{O}$  and  $^{29,31}\text{F}$**   
S.-Z. Xu · S.-S. Zhang · X.-Q. Jiang · M.S. Smith
- 7 Prediction of synthesis cross sections of new moscovium isotopes in fusion-evaporation reactions**  
P.-H. Chen · H. Wu · Z.-X. Yang · X.-H. Zeng · Z.-Q. Feng
- 9 Investigation of  $\beta^-$ -decay half-life and delayed neutron emission with uncertainty analysis**  
Y.-F. Gao · B.-S. Cai · C.-X. Yuan

NUCLEAR ENERGY SCIENCE AND ENGINEERING

- 2 Efficient extraction of U(VI) ions from solutions**  
Y.-W. Cai · M. Fang · B.-W. Hu · X.-K. Wang
- 14 Mesh-free semi-quantitative variance underestimation elimination method in Monte Carlo algorithm**  
P.-F. Shen · X.-D. Huo · Z.-G. Li · Z. Shao · H.-F. Yang · P. Zhang · K. Wang
- 17 Analysis of burnup performance and temperature coefficient for a small modular molten-salt reactor started with plutonium**  
X.-C. Zhao · Y. Zou · R. Yan · X.-Z. Cai

CORRECTION

- 10 Correction to: Measurement of  $^{134}\text{Xe}(n,2n)^{133\text{m,g}}\text{Xe}$  reaction cross sections in 14-MeV region with detailed uncertainty quantification**  
J.-H. Luo · J.-C. Liang · L. Jiang · F. Tuo · L. Zhou · L. He

# Nuclear Science and Techniques

Volume 34 • Issue 1 • January 2023

ISSN: 1001-8042 (Paper); CN 31-1559/TL

## VIEWPOINT AND RESEARCH HIGHLIGHT

- 15 **Vector meson spin alignment by the strong force field**  
X.-N. Wang
- 16 **New type of double-slit interference experiment at Fermi scale**  
Y.-G. Ma

## ACCELERATOR, RAY TECHNOLOGY AND APPLICATIONS

- 6 **The MING proposal at SHINE: megahertz cavity enhanced X-ray generation**  
N.-S. Huang · Z.-P. Liu · B.-J. Deng · Z.-H. Zhu · S.-H. Li · T. Liu · Z. Qi · J.-W. Yan · W. Zhang · S.-W. Xiang · Y.-Y. Lei · Y. Zhu · Y.-Z. He · Q.-B. Yuan · F. Gao · R.-B. Deng · S. Sun · Z.-D. Lei · Z.-Q. Jiang · M.-Q. Duan · Y. Zhuan · X.-F. Huang · P.-C. Dong · Z.-L. Li · S.-Y. Si · L. Xue · S. Chen · Y.-F. Liu · Y.-J. Tong · H.-X. Deng · Z.-T. Zhao
- 11 **Static superconducting gantry-based proton CT combined with X-ray CT as prior image for FLASH proton therapy**  
Y.-Q. Yang · W.-C. Fang · X.-X. Huang · J.-H. Tan · C. Wang · C.-P. Wang · Z.-T. Zhao
- 13 **Optimization method of Hadamard coding plate in  $\gamma$ -ray computational ghost imaging**  
Z. Zhou · S.-G. Li · Q.-S. Tan · L. Yang · M.-Z. Liu · M. Wang · L. Wang · Y. Cheng

## NUCLEAR ELECTRONICS AND INSTRUMENTATION

- 1 **Large area  $^3\text{He}$  tube array detector with modular design for multi-physics instrument at CSNS**  
L. Zhu · J.-R. Zhou · Y.-G. Xia · L. Xiao · H. Luo · X.-J. Zhou · W.-Q. Yang · B.-J. Guan · X.-F. Jiang · Y.-F. Wang · H. Xu · H.-Y. Teng · L.-X. Zeng · J.-J. Li · L. Hu · K. Zhou · Y.-X. Qiu · P.-X. Shen · J. Xu · L.-J. Liao · X.-Z. Wang · G.-A. Yang · H.-C. Chen · J.-P. Xu · Z.-D. Li · S.-L. Wang · J. Zhuang · Y.-B. Zhao · J.-R. Zhang · W. Yin · Z.-J. Sun · Y.-B. Chen
- 3 **Conceptual design of a  $\text{Cs}_2\text{LiLaBr}_6$  scintillator-based neutron total cross section spectrometer on the back-n beam line at CSNS**  
D.-J. Zhao · S. Feng · P.-J. Cheng · R. Liu · W. Luo · H.-Q. Wang · J.-M. Xue · K. Zhu · B. Zheng
- 8 **Performance of real-time neutron/gamma discrimination methods**  
S.-X. Liu · W. Zhang · Z.-H. Zhang · S. Lin · H.-R. Cao · C.-X. Song · J.-L. Zhao · G.-Q. Zhong
- 12 **Afterpulse measurement of JUNO 20-inch PMTs**  
R. Zhao · N. Anfimov · Y. Chen · H. Hu · J. Hu · X.-L. Ji · D. Korablev · M. Li · A. Olshevskiy · Z.-Y. Peng · A. Rybnikov · Z.-H. Qin · J. Wang · W. Wang · Z.-M. Wang · B. Wonsak

(Table of contents continued on inside back cover)

