

PAPER • OPEN ACCESS

K-Shell Photoionization of the Oxygen Isonuclear Sequence

To cite this article: M F Gharaibeh *et al* 2015 *J. Phys.: Conf. Ser.* **635** 092074

View the [article online](#) for updates and enhancements.

You may also like

- [LOCALIZATION AND BROADBAND FOLLOW-UP OF THE GRAVITATIONAL-WAVE TRANSIENT GW150914](#)
B. P. Abbott, R. Abbott, T. D. Abbott et al.
- [Valence-Shell-Photoelectron Imaging of Controlled Biomolecules](#)
Joss Wiese, Sebastian Trippel and Jochen Küpper
- [Perpendicular diffusion of solar energetic particles: When is the diffusion approximation valid?](#)
R D Strauss, J P van den Berg, P J Steyn et al.

PRIME
PACIFIC RIM MEETING
ON ELECTROCHEMICAL
AND SOLID STATE SCIENCE
HONOLULU, HI
October 6-11, 2024

Joint International Meeting of
The Electrochemical Society of Japan (ECSJ)
The Korean Electrochemical Society (KECS)
The Electrochemical Society (ECS)

Early Registration Deadline:
September 3, 2024

**MAKE YOUR PLANS
NOW!**

K-Shell Photoionization of the Oxygen Isonuclear Sequence

M F Gharaibeh^{a,b,1}, J M Bizau^c, D Cubaynes^c, S Guilbaud^c, M M Al Shorman^c,
 I Q Ababneh^b, I Sakho^d, C Blancard^e, and B M McLaughlin^{f,g,2}

^aDepartment of Mathematics, Statistics and Physics, P. O. Box 2713, Qatar University, Doha, Qatar

^bDepartment of Physics, Jordan University of Sciences and Technology, Irbid 22110, Jordan

^cInstitut des Sciences Moléculaires d'Orsay (ISMO), CNRS UMR 8214,
 Université Paris-Sud, Bât. 350, F-91405 Orsay cedex, France

^dDepartment of Physics, UFR of Sciences and Technologies,
 University Assane Seck of Ziguinchor, Ziguinchor, Senegal

^eCEA-DAM-DIF, Bruyères-le-Châtel, F-91297 Arpajon Cedex, France

^fCentre for Theoretical Atomic and Molecular Physics (CTAMOP), School of Mathematics and Physics,
 Queen's University of Belfast, Belfast BT7 1NN, UK

^gInstitute for Theoretical Atomic and Molecular Physics (ITAMP),

Harvard Smithsonian Center for Astrophysics, MS-14, Cambridge, MA 02138, USA

Synopsis K-shell photoionization cross-section measurements for the oxygen isonuclear sequence from N-like to Li-like made at the SOLEIL Light Source are compared with SUNC, MCDF and R-matrix calculations.

Single and multiply ionization stages of C,

of results will be presented at the meeting.

N, O, Ne and Fe have been observed in the ionized outflow in the planetary nebulae NGC 4051, measured with the satellite XMM-Newton in the soft-x-ray region, the Seyfert galaxy NGC 3783, including UV imaging, x-ray and UV light curves, the 0.2 -10 keV x-ray continuum, the iron K-emission line, and high-resolution spectroscopy in the modelling of the soft x-ray warm absorber [1, 2].

Detailed measurements of the absolute K-shell single photoionization cross sections for N-like to Li-like oxygen ions obtained (for the first time) at the SOLEIL synchrotron radiation facility are compared with theoretical predictions made using the SCUNC, MCDF and RMPS methods. The theoretical work enables the identification and characterization of the very strong 1s → 2p transitions found in the spectra of these ions and other resonance features observed below the K-edge region in most of these ions.

The first measurements in the isonuclear sequence for O³⁺ were published recently [3], the experimental and theoretical data for the O⁺ and O²⁺ ions are in preparation. The O⁴⁺ and O⁵⁺ will be explored in May 2015 and all this data will be presented at the conference.

Fig. 1 illustrates the cross section results in the region of the 1s → 2p transition for B-like oxygen. Further details and a comprehensive set

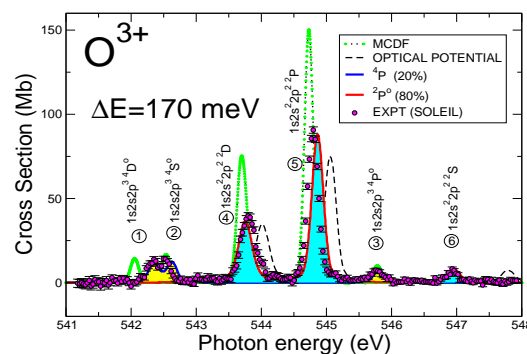


Figure 1. (Colour online) Photoionization cross sections for O³⁺ ions measured with a 170 meV band pass in the region of 1s → 2p photo-excitations. Solid points (magenta), experimental cross sections. The R-matrix (RMPS, solid red line, and blue line) results. Dotted line with solid green circles the MCDF calculations. The optical potential R-matrix results (dashed black) are from Garcia and co-workers [4]. Theoretical work was convoluted with a Gaussian profile of 170 meV FWHM and an appropriate weighting of the ground and metastable states to simulate the measurements [3].

References

- [1] P. M. Ogle *et al.*, *Astrophys. J.*, 606, 151 (2004).
- [2] A. J. Blustin *et al.*, *Astron. Astrophys.*, 391, 453 (2002).
- [3] B. M. McLaughlin *et al.*, *J. Phys. B: At. Mol. & Opt. Phys.*, 47, 115201 (2014).
- [4] J. Garcia *et al.*, *Astrophys. J. Suppl. Ser.*, 158, 68 (2005).

¹E-mail: mgharaibeh@qu.edu.qa

²E-mail: b.mclaughlin@qub.ac.uk

