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P. M. Vreeswijk, C. Ledoux, A. Smette, S. L. Ellison, A. O. Jaunsen, et al.. Corrigendum: Rapid-response mode VLT/UVES spectroscopy of GRB 060418. Conclusive evidence for UV pumping from the time evolution of Fe II and Ni II excited- and metastable-level populations. *Astronomy & Astrophysics*, 2011, 532, 10.1051/0004-6361/20066780e . insu-03645939

HAL Id: insu-03645939

<https://hal-insu.archives-ouvertes.fr/insu-03645939>

Submitted on 22 Apr 2022

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Rapid-response mode VLT/UVES spectroscopy of GRB 060418

Conclusive evidence for UV pumping from the time evolution of Fe II and Ni II excited- and metastable-level populations

(Corrigendum)

P. M. Vreeswijk¹, C. Ledoux², A. Smette², S. L. Ellison³, A. O. Jaunsen⁴, M. I. Andersen^{5,6}, A. S. Fruchter⁷, J. P. U. Fynbo⁶, J. Hjorth⁶, A. Kaufer², P. Møller⁸, P. Petitjean⁹, S. Savaglio¹⁰, and R. A. M. J. Wijers¹¹

¹ Centre for Astrophysics and Cosmology, Science Institute, University of Iceland, Dunhagi 5, 107 Reykjavík, Iceland
e-mail: pmv@raunvis.hi.is

² European Southern Observatory, Alonso de Córdova 3107, Casilla 19001, Santiago 19, Chile

³ Department of Physics and Astronomy, University of Victoria, Victoria, BC, Canada

⁴ Institute of Theoretical Astrophysics, University of Oslo, PO Box 1029 Blindern, 0315 Oslo, Norway

⁵ Space Science Center, Niels Bohr Institute, University of Copenhagen, 2100 Copenhagen, Denmark

⁶ Dark Cosmology Centre, Niels Bohr Institute, University of Copenhagen, 2100 Copenhagen, Denmark

⁷ Space Telescope Science Institute, 3700 San Martin Drive, Baltimore, MD 21218, USA

⁸ European Southern Observatory, Karl-Schwarzschild-Str. 2, 85748, Garching bei München, Germany

⁹ Institut d'Astrophysique de Paris, UMR 7095 CNRS & Université Pierre et Marie Curie, 98bis boulevard Arago, 75014 Paris, France

¹⁰ Max-Planck-Institut für Extraterrestrische Physik, Giessenbachstrasse, 85748 Garching bei München, Germany

¹¹ Astronomical Institute Anton Pannekoek and GRAPPA, Science Park 904, 1098 XH, Amsterdam, The Netherlands

A&A 468, 83–96 (2007), DOI: 10.1051/0004-6361:20066780

A&A 491, 189–207 (2008), DOI: 10.1051/0004-6361:200810286

A&A 506, 661–675 (2009), DOI: 10.1051/0004-6361/200811572

Key words. Gamma rays: bursts – galaxies: abundances – galaxies: ISM – galaxies: distances and redshifts – quasars: absorption lines – errata, addenda

We have recently realized that, in Eq. (3) in Vreeswijk et al. (2007), the flux $F_{\nu}(\tau_0)$ should be divided by 4π . The relation should therefore read as follows:

$$\frac{dN_u}{dt} = N_l B_{lu} \frac{F_{\nu}(\tau_0)}{4\pi} - N_u \left[A_{ul} + B_{ul} \frac{F_{\nu}(\tau_0)}{4\pi} \right]. \quad (3)$$

Using this relation, our excitation program is now fully consistent with the PopRatio code (Silva & Viegas 2002, see also Sect. 5.2) when neglecting collisional excitation, and in the optically thin regime as PopRatio assumes all transitions are optically thin. The consequence is that excitation is a factor of 4π less effective than we had previously assumed, resulting in a decreased distance estimate by a factor of $\sqrt{4\pi} \sim 3.5$. Therefore, the distance of GRB 060418 to the neutral absorbing material – previously $d = 1.7 \pm 0.2$ kpc – needs to be revised to $d = 0.48 \pm 0.06$ kpc, under the same model assumptions.

The main conclusion of the paper, that the neutral absorbing gas is not in the immediate environment of GRB 060418, remains the same.

Since we applied the same excitation analysis in Sect. 4.1.3 of Fox et al. (2008) and in Sect. 2.3 of Ledoux et al. (2009), the distance estimates therein should also be scaled down by a factor of $\sqrt{4\pi}$. The main conclusions of these two papers are not affected by this change either.

References

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