

High-resolution spectra of comet C/2013 R1 (Lovejoy)

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Comet C/2013 R1 (Lovejoy) is a long-period comet discovered on 7 September 2013 by Terry Lovejoy with a 0.2-m telescope (Guido et al., 2013), it passed its perihelion (0.81 au) on 22 December 2013. It was a bright comet visible to the naked eye. We obtained high-resolution spectra of this comet immediately after its perihelion passage during 4 nights in the period 23–26 December 2013. These spectra have been obtained with the 3.5-m Telescopio Nazionale Galileo (TNG) and the High Accuracy Radial velocity Planet Searcher in North hemisphere (HARPS-N) echelle spectrograph.

HARPS-N is an echelle spectrograph covering the spectral range from 383 to 693 nm, with a spectral resolution of $R = 115000$ (Cosentino et al., 2012). It is designed to measure stellar radial velocities in view of detecting extrasolar planets. Our observations are the first successful cometary observations performed with this instrument. They demonstrate that this spectrograph can also be efficient for getting cometary spectra, even if the sensitivity of this instrument is low in the blue part of its spectral coverage.

We will present the results of our data analysis for these spectra. This analysis is focused on isotopic ratios, mainly $^{12}\text{C}/^{13}\text{C}$ with C_2 emission lines (with the method described in Rousselot et al. 2012) and $^{14}\text{N}/^{15}\text{N}$ with $^{14}\text{NH}_2$ and $^{15}\text{NH}_2$ emission lines (with the line wavelengths given in Rousselot et al. 2014), atomic oxygen emission lines at 557.7, 630.0 and 636.4 nm (intensity ratios and widths, see Decock et al. 2013) and relative production rates of the detected species.

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References: Cosentino, R., Lovis, C., Pepe, F. et al. 2012, SPIE 8446, id. 84468E, 8 pp; Decock, A., Jehin, E., Hutsemékers, D., Manfroid, J. 2013, A&A 555, id.A34, 14 pp; Guido, E., Howes, N., Sato, H., et al. 2013, CBET 3649, 1; Rousselot, P., Jehin, E., Manfroid, J., Hutsemékers, D. 2012, A&A 545, id.A24, 7 pp; Rousselot, P., Pirali, O., Jehin, E., et al. 2014, ApJL 780: L17, 5 pp.