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Authors	BIAZZO, Katia, GRATTON, Raffaele, DESIDERA, Silvano, LUCATELLO, Sara, SOZZETTI, Alessandro, Gandolfi, D., AFFER, Laura, BOCCATO, Caterina, BORSA, Francesco, CLAUDI, Riccardo, COVINO, Elvira, LANZA, Antonino Francesco, Marzari, F., MICELA, Giuseppina, MOLARO, Paolo, PAGANO, Isabella, Pedani, M., PILLITTERI, Ignazio Francesco, Piotto, G., PORETTI, Ennio, Santos, N. C., SCANDARIATO, GAETANO, Zanmar Sanchez, R., BONOMO, ALDO STEFANO, Damasso, Mario, COSENTINO, Rosario, KNAPIC, Cristina, MALDONADO PRADO, Jesus, RAINER, Monica
Handle	http://hdl.handle.net/20.500.12386/23830
Journal	VizieR Online Data Catalog



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J/A+A/583/A135 XO-2N and XO-2S spectra (Biazzo+, 2015)

The GAPS programme with HARPS-N at TNG.

X. Differential abundances in the XO-2 planet hosting binary.

Biazzo K., Gratton R., Desidera S., Lucatello S., Sozzetti A., Bonomo A.S., Damasso M., Gandolfi D., Affer L., Boccato C., Borsa F., Claudi R., Cosentino R., Covino E., Knapic C., Lanza A.F., Maldonado J., Marzari F., Micela G., Molaro P., Pagano I., Pedani M., Pillitteri I., Piotto G., Poretti E., Rainer M., Santos N.C., Scandariato G., Zanmar Sanchez R.

<Astron. Astrophys. 583, A135 (2015)>

=[2015A&A...583A.135B](#) (SIMBAD/NED BibCode)

ADC_Keywords: Stars, double and multiple ; Planets ; Spectroscopy

Keywords: planetary systems - stars: abundances - techniques: spectroscopic - stars: individual: XO-2N - stars: individual: XO-2S

Abstract:

Binary stars hosting exoplanets are a unique laboratory where chemical tagging can be performed to measure with high accuracy the elemental abundances of both stellar components, with the aim to investigate the formation of planets and their subsequent evolution. Here, we present a high-precision differential abundance analysis of the XO-2 wide stellar binary based on high resolution HARPS-N@TNG spectra. Both components are very similar K-dwarfs and host planets. Since they formed presumably within the same molecular cloud, we expect they should possess the same initial elemental abundances. We investigate if the presence of planets can cause some chemical imprints in the stellar atmospheric abundances. We measure abundances of 25 elements for both stars with a range of condensation temperature $T_c=40-1741\text{K}$, achieving typical precisions of $\sim 0.07\text{dex}$. The North component shows abundances in all elements higher by $+0.067\pm 0.032\text{dex}$ on average, with a mean difference of $+0.078\text{dex}$ for elements with $T_c > 800\text{K}$. The significance of the XO-2N abundance difference relative to XO-2S is at the 2σ level for almost all elements. We discuss the possibility that this result could be interpreted as the signature of the ingestion of material by XO-2N or depletion in XO-2S due to locking of heavy elements by the planetary companions. We estimate a mass of several tens of M_{earth} in heavy elements. The difference in abundances between XO-2N and XO-2S shows a positive correlation with the condensation temperatures of the elements, with a slope of $(4.7\pm 0.9)\times 10^{-5}\text{dex/K}$, which could mean that both components have not formed terrestrial planets, but that first experienced the accretion of rocky core interior to the subsequent giant planets.

Description:

Final reduced spectra used for the elemental abundance measurements. We observed both XO-2 components with the high resolution HARPS-N@TNG (R~115000, $\lambda\sim 3900-6900\text{\AA}$) spectrograph between November 20, 2012 and October 4, 2014. Solar spectra were also obtained through observations of the asteroid Vesta. The spectra reduction was obtained using the 2013 November version of the HARPS-N instrument data reduction software (DRS) pipeline. A detailed description of the observations and data reduction is reported in Paper II (Desidera et al., [2013A&A...554A..29D](#))

Objects:

RA	(2000)	DE	Designation(s)
07 48 06.47	+50 13 33.0	XO-2N = TYC 3413-5-1	
07 48 07.48	+50 13 03.3	XO-2S = TYC 3413-210-1	

File Summary:

FileName	Lrecl	Records	Explanations
ReadMe	80	.	This file
list.dat	89	2	List of spectra
fits/*	0	2	Individual fits spectra

See also:

[J/ApJ/770/36](#) : APOSTLE transits of XO-2 system (Kundurthy+, 2013)
[J/A+A/554/A28](#) : Qatar-1 differential light curve (Covino+, 2013)
[J/A+A/575/A111](#) : GAPS V: Global analysis of the XO-2 system (Damasso+, 2015)
[J/A+A/575/L15](#) : TrES-4b RV and Ic curves (Sozzetti+, 2015)
[J/A+A/578/A64](#) : tau Bootis A radial velocity curve (Borsa+, 2015)

Byte-by-byte Description of file: [list.dat](#)

Bytes	Format	Units	Label	Explanations
1-	2	I2	h	RAh
4-	5	I2	min	RAm
				Right ascension (J2000)
				Right ascension (J2000)

7-	11	F5.2	s	RAs	Right ascension (J2000)
	13	A1	---	DE-	Declination sign (J2000)
14-	15	I2	deg	DEd	Declination (J2000)
17-	18	I2	arcmin	DEm	Declination (J2000)
20-	23	F4.1	arcsec	DEs	Declination (J2000)
25-	30	I6	----	Nx	Number of points
32-	35	I4	0.1nm	blambda	Lower value of wavelength interval
37-	40	I4	0.1nm	Blambda	Upper value of wavelength interval
42-	45	F4.2	0.1nm	dlambda	Spectral resolution
47-	50	I4	Kibyte	size	Size of the fits file
52-	74	A23	---	FileName	Name of the fits file in subdirectory fits
76-	89	A14	---	Title	Title of the file

Acknowledgements:

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References:

Covino et al., Paper I [2013A&A...554A..28C](#), Cat. [J/A+A/554/A28](#)
Desidera et al., Paper II [2013A&A...554A..29D](#)
Esposito et al., Paper III [2014A&A...564L..13E](#)
Desidera et al., Paper IV [2014A&A...567L...6D](#)
Damasso et al., Paper V [2015A&A...575A.111D](#), Cat. [J/A+A/575/A111](#)
Sozzetti et al., Paper VI [2015A&A...575L..15S](#), Cat. [J/A+A/575/L15](#)
Borsa et al., Paper VII [2015A&A...578A..64B](#), Cat. [J/A+A/578/A64](#)
Mancini et al., Paper VIII [2015A&A...579A.136M](#)

(End)

Patricia Vannier [CDS] 14-Sep-2015

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