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Authors	Samland, M., Molliere, P., Bonnefoy, M., Maire, A. -L., Cantalloube, F., Cheetham, A. C., MESA, DINO, GRATTON, Raffaele, Biller, B. A., Wahhaj, Z., Brandner, W., Carson, J., Janson, M., Henning, T., Homeier, D., Mordasini, C., Langlois, M., Bouwman, J., Quanz, S. P., Zurlo, A., Schlieder, J. E., Avenhaus, H., Beuzit, J. -L., Boccaletti, A., Bonavita, M., Chauvin, G., CLAUDI, Riccardo, Cudel, M., DESIDERA, Silvano, Feldt, M., Fusco, T., Galicher, R., Kopytova, T. G., Lagrange, A. -M., Le Coroller, H., Martinez, P., Moeller-Nilsson, O., Mouillet, D., Mugnier, L. M., Perrot, C., Sevin, A., Sissa, E., Vigan, A., Weber, L.
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J/A+A/603/A57 51 Eri b SPHERE/IFS spectra & atmosphere models (Samland+, 2017)

Spectral and atmospheric characterization of 51 Eridani b using VLT/SPHERE.
Samland M., Molliere P., Bonnefoy M., Maire A.-L., Cantalloube F.,
Cheetham A.C., Mesa D., Gratton R., Biller B.A., Wahhaj Z., Brandner W.,
Carson J., Janson M., Henning T., Homeier D., Mordasini C., Langlois M.,
Bouwman J., Quanz S.P., Zurlo A., Schlieder J.E., Avenhaus H.,
Beuzit J.-L., Boccaletti A., Bonavita M., Chauvin G., Claudi R., Cudel M.,
Desidera S., Feldt M., Fusco T., Galicher R., Kopytova T.G.,
Lagrange A.-M., Le Coroller H., Martinez P., Moeller-Nilsson O.,
Mouillet D., Mugnier L.M., Perrot C., Sevin A., Sissa E., Vigan A., Weber L.
<Astron. Astrophys. 603, A57 (2017)>
=[2017A&A...603A..57S](#) (SIMBAD/NED BibCode)

ADC_Keywords: Stars, double and multiple ; Planets ; Spectroscopy ;
Spectra, infrared ; Models, atmosphere
Keywords: stars: individual: 51 Eridani - planets and satellites: atmospheres -
methods: data analysis - techniques: high angular resolution -
techniques: image processing

Abstract:
51 Eridani b is an exoplanet around a young (20Myr) nearby (29.4pc)
F0-type star, which was recently discovered by direct imaging. It is
one of the closest direct imaging planets in angular and physical
separation (~0.5", ~13AU) and is well suited for spectroscopic
analysis using integral field spectrographs. We aim to refine the
atmospheric properties of the known giant planet and to constrain the
architecture of the system further by searching for additional
companions. We used the extreme adaptive optics instrument SPHERE at
the Very Large Telescope (VLT) to obtain simultaneous dual-band
imaging with IRDIS and integral field spectra with IFS, extending the
spectral coverage of the planet to the complete Y- to H-band range and
providing additional photometry in the K12-bands (2.11, 2.25 micron).

We present the first spectrophotometric measurements in the Y and K
bands for the planet and revise its J-band flux to values 40% fainter
than previous measurements. Cloudy models with uniform cloud coverage
provide a good match to the data. We derive the temperature, radius,
surface gravity, metallicity, and cloud sedimentation parameter τ_{sed} .
We find that the atmosphere is highly super-solar ($[\text{Fe}/\text{H}]\sim 1.0$), and
the low $\tau_{\text{sed}}\sim 1.26$ value is indicative of a vertically extended,
optically thick cloud cover with small sized particles. The model
radius and surface gravity estimates suggest higher planetary masses
of $M_{\text{gravity}}=9.1^{+4.9}_{-3.3}$. The evolutionary model only provides a
lower mass limit of $>2M_{\text{jupiter}}$ (for pure hot-start). The cold-start
model cannot explain the luminosity of the planet. The SPHERE and
NACO/SAM detection limits probe the 51 Eri system at solar system
scales and exclude brown-dwarf companions more massive than
 $20M_{\text{jupiter}}$ beyond separations of ~2.5AU and giant planets more
massive than $2M_{\text{jupiter}}$ beyond 9 au.

Description:
One fits file for each spectrum of 51 Eridani b (SPHERE IFS-YJ,
IFS-YH, Samland et al., 2017, this work; GPI-H band, Macintosh et al.,
2015, Cat. [J/other/Sci/350.64](#)). The first extension of the file
contains the spectrum used in the paper (fits-table). The second
extension contains the correlation matrix for the uncertainty of the
spectral points (fits-image). The petitCODE (a self-consistent 1d
radiative-convective equilibrium code, see Molliere et al.,
[2015ApJ...813...47M](#), [2017A&A...600A..10M](#)) atmospheric model grids
(cloudy and clear) as used and described in Samland et al. 2017, this
work, are provided as fits-files. The first extension contains the
wavelength sampling of the model cube at a resolution of 1000 (same
for all models). The second extension contains the table of all model
parameter combinations (each row one model, columns represent
parameters). The third extension contains the flattened model cube as
2D-fits image (index of row of table in 2nd ext. corresponds to index
of model in 3rd extension). The header of the 3rd extension gives the
dimensions of the model cube prior to flattening to make it easy to
restore the non-flattened shape if necessary. Units and descriptions
can always be found in the respective headers.

Objects:

RA	(2000)	DE	Designation(s)
04 37 36.13	-02 28 24.8		51 Eri = HR 1474

File Summary:

FileName	Lrecl	Records	Explanations
ReadMe	80	.	This file
list.dat	94	5	List of fits files
fits/*	0	5	Individual fits files

[J/other/Sci/350.64](#) : 51 Eri b near-infrared spectrum (Macintosh+, 2015)

Bytes	Format	Units	Label	Explanations
1-	2	I2	h	RAh ? Right Ascension of center (J2000)
4-	5	I2	min	RAm ? Right Ascension of center (J2000)
7-	11	F5.2	s	RA_s ? Right Ascension of center (J2000)
13	13	A1	---	DE- ? Declination sign of center (J2000)
14-15	15	I2	deg	DEd ? Declination sign of center (J2000)
17-18	12		arcmin	DEm ? Declination sign of center (J2000)
20-23	F4.1		arcsec	DEs ? Declination sign of center (J2000)
25-26	12		Mbyte	size Size of FITS file
28-52	A25		---	FileName Name of FITS file, in subdirectory fits
54-94	A41		---	Title Title of the FITS file

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Patricia Vannier [CDS] 16-May-2017

The document above follows the rules of the [Standard Description for Astronomical Catalogues](#): from this documentation it is possible to generate `f77` program to load files [into arrays](#) or [line by line](#)

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