
Disentangled cascade adaptive optics for the SPHERE instrument forthcoming upgrade

Nicolas Galland^{*†1}, Henri Francois Raynaud¹, Markus Kasper², Charles Goulas³, Clémentine Béchet⁴, Florian Ferreira³, Michel Tallon⁴, Fabrice Vidal³, Maud Langlois⁴, Anthony Boccaletti³, Gael Chauvin⁵, Emiliano Diolaiti⁶, Raffaele Gratton⁷, Magali Loupiau⁴, Julien Milli⁸, François Wildi, and Caroline Kulcsar¹

¹Université Paris-Saclay, Institut d'Optique Graduate School, CNRS, Laboratoire Charles Fabry, 91127, Palaiseau, France. – Université Paris-Saclay, Institut d'Optique Graduate School, CNRS, Laboratoire Charles Fabry – 91127, Palaiseau, France

²European Southern Observatory – Karl-Schwarzschild Str. 2 D-85748 Garching bei Munchen, Germany

³LESIA – Institut National des Sciences de l'Univers, Observatoire de Paris, Sorbonne Université, Centre National de la Recherche Scientifique, Université Paris Cité – 5, place Jules Janssen 92190 MEUDON, France

⁴CRAL – Ecole Normale Supérieure de Lyon, Université Claude Bernard Lyon 1, Institut National des Sciences de l'Univers, Centre National de la Recherche Scientifique – 9 Avenue Charles André 69561 ST GENIS LAVAL CEDEX, France

⁵Laboratoire Lagrange – Observatoire de la Côte d'Azur, Université Côte d'Azur, Centre National de la Recherche Scientifique – Boulevard de l'Observatoire, Nice Cedex 04, France

⁶INAF - Osservatorio di Astrofisica e Scienza dello Spazio (OAS) – via Gobetti 93/3, 40129 Bologna, Italy

⁷INAF - Osservatorio Astronomico di Padova (OAPd) – Vicolo dell'Osservatorio 5, 35122 Padova, Italy

⁸Institut de Planétologie et d'Astrophysique de Grenoble – Centre National d'Études Spatiales [Toulouse], observatoire des sciences de l'univers de Grenoble – 414, Rue de la Piscine BP 53 38041 Grenoble Cedex 9, France

Abstract

The Spectro-Polarimetric High-contrast Exoplanet REsearch instrument (SPHERE) is a European Southern Observatory (ESO) exoplanet imaging instrument installed on the 8m Very Large Telescope at Paranal (Chile). The results obtained during 8 years of operation since its commissioning in 2014 have encouraged ESO to define new science objective and thus to develop an upgrade of the instrument withing the SPHERE+ project. Considering the predominant role of adaptive optics (AO) for high contrast imaging and coronagraphy, it has been decided to update the AO system of SPHERE by adding a second stage of correction that will take as an input the residual wavefront from the first stage. This article presents some control developments for this second AO stage, including specific issues induced by the two-stage approach. We investigate a particular solution to address the problem of a non stochastic signal arising from the oversampling of the first stage residue.

*Speaker

†Corresponding author: nicolas.galland@institutoptique.fr

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