

SHINE, the SPHERE High-Contrast Imaging Survey for Exoplanets

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Abstract

The SHINE survey for SPHERE High-contrast Imaging survey for Exoplanets, is a large direct imaging near-infrared survey of 600 young, nearby stars carried out in the context of the SPHERE consortium Guaranteed Time Observations representing 200 nights spread between 2015 and 2020. Our scientific goals are to characterize known planetary systems (architecture, orbit, stability, luminosity, atmosphere), to search for new planetary systems using SPHERE's unprecedented performances, finally to determine the occurrence and orbital and mass function properties of the wide-orbit, giant planet population as a function of the stellar host mass and age.

fine characterization of the physical properties and atmospheres of the lightest and coolest Jovian exoplanets imaged to date, and finally the survey completeness and the constraints set on the occurrence and the formation of giant planets beyond 5-10au.

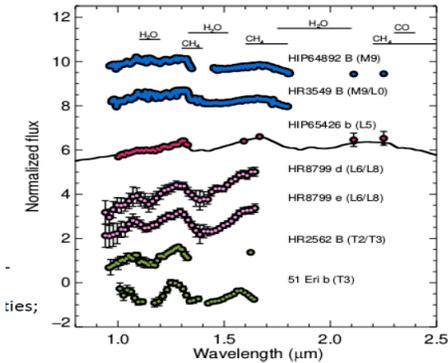


Figure 1: SHINE survey exoplanets/Brown Dwarfs characterization

In this talk, after summarizing the SHINE strategy and current performances after almost 4 years of operation, I will review the breakthrough results obtained so far including the discoveries of new exoplanet/BD companions and disks, the study of young planetary system architecture and stability, the

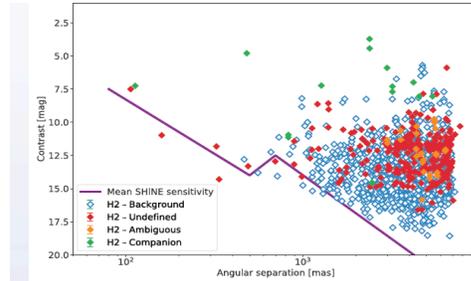


Figure 2: SHINE survey detection limits, candidate companions contrast and classification using astrometry and color-magnitude diagram rejection (Langlois, In prep.)

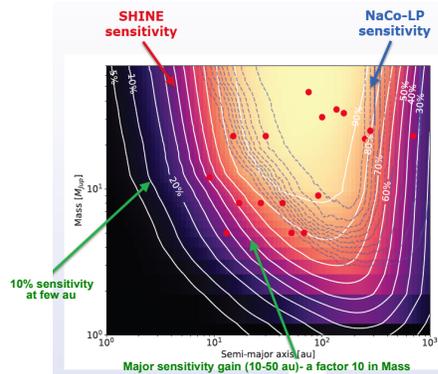


Figure 3: QMESS (Bonavita, 2013) average detection probability for SHINE using observed targets (Vigan, In prep.)

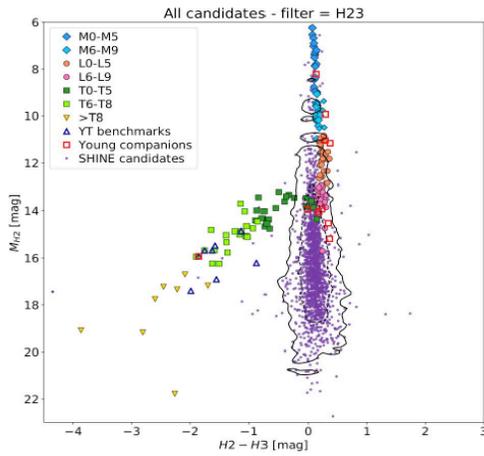


Figure 4: Color-magnitude diagram including all SHINE candidates and example of known systems.

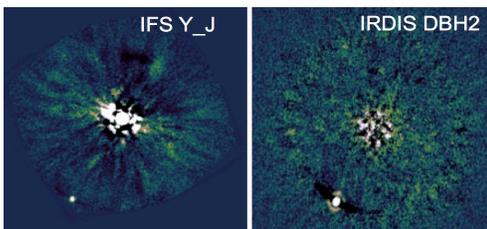


Figure 5: Illustration of the SHINE high contrast capability – Images of the newly discovered exoplanetary HIP65426 b (Chauvin et al. 2017).

Conclusions

The SHINE program is a large high-contrast near-infrared survey of more than 600 young, nearby stars. Aiming at searching for and characterizing new planetary systems using VLT/SPHERE, it achieves unprecedented high-contrast and high-angular resolution capabilities which bring fine characterization of the physical properties and atmospheres of Jovian exoplanets and new statistical constraints on the occurrence and orbital properties of the giant planet population at large orbits as a function of the stellar host mass and age.

Acknowledgements

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