

What can we expect from near to mid-term direct imaging programs?

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Abstract

Direct imaging for exoplanets has made enormous progress in the last decade owing to the advent of new technologies, efficient algorithms for postprocessing and dedicated observing strategies. A few young giant exoplanets were detected with the previous generation of instruments (beta Pic b, HR8799bcde, HR95086b ...). While SPHERE and GPI were conceived with this very purpose, we are thus expecting many more discoveries in the next years. SPHERE comes with a series of facilities to characterize the atmosphere of these planets, from the visible to the near IR, with broad band, narrow band filters, and low to medium resolution spectroscopy as well. It is also a fabulous instrument to study circumstellar disks both in intensity and polarimetry in order to establish the link between planets and their environments. A large survey of 600 targets on a 5 years baseline has been started. The next space telescope, JWST equipped with MIRI and NIRCAM will extend the ability to characterize young giants in the mid IR. No doubt we will learn more about their atmospheres. Finally, by the next decade, very large apertures will become available on the ground. Extremely Large Telescope will have general first light instruments (MICADO, HARMONI), but some programs to image and characterize young giant planets around very distant stars (>100pc) will be feasible. For a much ambitious goal, detecting telluric planets and studying their atmosphere, two paths are now considered either from space (WFIRST AFTA-C is a good candidate) and from the ground with SPHERE-like instruments on ELTs. A review of achievements and perspectives in the context of direct imaging will be presented.