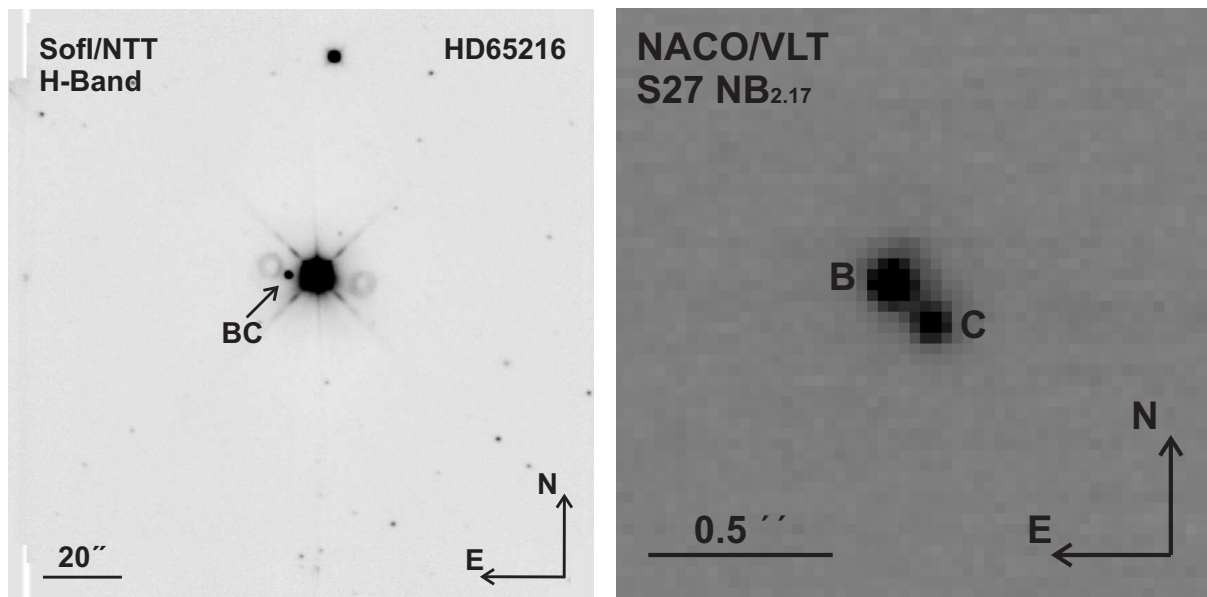


Multiplicity study of exoplanet host stars

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We summarize the previous results of our ongoing multiplicity study of exoplanet host stars. This study started in 2002 with the first observations carried out at the 3.6 m ESO-NTT at La Silla observatory in Chile and was extended later on using the 3.8 m UKIRT at Mauna Kea on Hawaii. In addition to these wide field seeing limited imaging programs also high contrast imaging is carried out to find very close faint companions or to investigate the multiplicity status of already detected wider companions. For this purpose we use the adaptive optics NACO at VLT, CIAO at Subaru, as well as ALFA at the 3.5 m Calar Alto telescope. New companions of exoplanet host stars are identified by comparing two images taken with an epoch difference of one to several years. Real companions share the well known proper motions of the exoplanet host stars, hence can be distinguished from unrelated background sources. Today 38 exoplanet host stellar systems are known and 12 were found and published in our survey, so far. Two detected companions emerged as white dwarfs. These detections clearly proof that planetary systems can also exist in evolved stellar systems, as predicted by theory. In addition, we found the first wide brown dwarf companion of an exoplanet host star, a T7 to T8 dwarf on a 480 AU orbit around HD 3651. Beside, single stellar or substellar companions also some close stellar pairs could be detected in orbit around some of our target stars, forming hierarchial triple star systems with exoplanets. Recently, we found HD 65216 A+BC the closest of these systems known today (see images below).



Left Pattern: The exoplanet host star HD 65216 with its co-moving companion imaged in the H-band with SofI at the 3.6 m ESO-NTT. After 10 minutes of integration time a detection limit of $H=19$ mag ($S/N > 10$) is reached. Due to the large SofI field of view wide companions of HD 65216 with angular separations of up to ~ 70 arcsec can be detected around the planet host star. By comparing two SofI images taken with an epoch difference of one year we found a co-moving companion of HD 65216 with a projected separation of ~ 250 AU. Further stellar companions around the exoplanet host star can be ruled out between 180 and 2400 AU of projected separation.

Right Pattern: The companion of HD 65216 observed with NACO/VLT through the narrow band filter $NB_{2.17}$. The total integration time is 14 minutes. NACO resolves the companion in a close pair of two low-mass stars, a M7 to M8 ($0.089 M_{\odot}$), and a L2 to L3 dwarf ($0.078 M_{\odot}$), separated from each other only by 0.17 arcsec (6 AU of projected separation). HD 65216 A+BC is a hierarchial triple star system with exoplanets, the closest of its kind presently known.