each other and establish the presence of Earth-pressure atmosphere through Rayleigh scattering.
The raw contrast requirements for such an instrument can be relaxed to 1e-8 if the mission spends 2 years collecting tens of thousands of images on the same target, enabling a factor of 500-1000 speckle suppression in post processing.
The light leak from both stars is controllable with a special wavefront control algorithm known as Multi-Star Wavefront Control (MSWC), which independently suppresses diffraction and aberrations from both stars using independent modes on the deformable mirror (see Thomas et al. at this conference).
The presentation will describe the general studies and calculations in more detail and briefly present examples of small coronagraphic mission concepts currently being developed to take advantage of this opportunity. (For more detail about one such concept, see Bendek et al. at this conference).

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311.02 – Space mission and instrument design to image the Habitable Zone of Alpha Centauri

The Alpha Centauri System is particularly well suited for high-contrast imaging. The angular separation of the A and B stars Habitable Zone ranges from 0.7” to 1.63” and 0.4” to 0.95” respectively, with contrast ratios for an earth-like planet in the order of 10^{-10}. A 35cm telescope using an aggressive coronagraph is capable of imaging and constrain the contents of earth-like, or larger planets, from the inner HZ out to the equivalent orbit of a Jupiter class planet. Here we present a mission concept design, which considers an off-axis telescope with elliptical aperture primary mirror, an embedded Phase Induced Amplitude Apodization lossless Coronagraph (PIAA), and a Kilo DM deformable mirror for wavefront control and speckle nulling. Our goal is to obtain $2x10^{11}$ contrast at 0.7” and $6x10^{11}$ contrast at 0.4” after post processing. To solve the binary diffraction contamination we will use the Multiple Star Wavefront Control approach than can correct for the light of both stars. We baseline a 3 year mission on a heliocentric orbit, that provides a thermally stable environment and continuous access to the target.

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311.03 – Absolute Calibration of the Radio Astronomy Flux Density Scale from 22 to 43 GHz using Planck

The Planck mission detected hundreds of extragalactic radio sources at frequencies from 28 to 857 GHz. Since Planck's calibration is absolute, based on the satellite's annual motion around the Sun, and since its beams are well-characterized at the sub-percent levels, Planck's flux density measurements are absolute to percent-level accuracy. We have made coordinated Planck, VLA and ATCA observations of ~60 strong, unresolved sources in order to compare Planck's absolute calibration to that used by these two interferometers at 22, 28 and 43 GHz. The flux densities of the sources used to calibrate the VLA observations are taken from Perley and Butler (2013), which is fundamentally based on models of the planet Mars calibrated via WMAP observations. The flux densities of the sources used to calibrate the ATCA observations are based on models of the planet Uranus. Despite the scatter introduced by the variability of many of the sources, the three flux density scales are determined to agree to 1-2% accuracy.

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311.04 – Low Frequencies on the NRAO VLA and the new VLA Ionospheric and Transient Experiment (VLITE)

The Karl G. Jansky Very Large Array (VLA), operated by the National Radio Astronomy Observatory (NRAO), has recently undergone an upgrade to a fully digital broadband system covering the frequency range of 1-50 GHz. The Naval Research Laboratory (NRL) has collaborated with NRAO to return low frequencies to the VLA in a new broadband receiver system. This system covers two bands from 56-86 MHz (4-band) and 240-470 MHz (P-band). Currently, the higher frequency (P-band) system is in regular use as part of the General Observing (GO) program on the VLA, while the lower frequency band is undergoing testing with a new feed design. We present an overview of the capabilities of the P-band system with some initial science results.
NRL has expanded the collaboration with NRAO to broaden the VLA low frequency capabilities through the development of the VLA Low Band Ionospheric and Transient Experiment (VLITE) which has dedicated samplers and fibers that tap the signal from 10 VLA P-band receivers and correlate those through a dedicated VLITE DiFX correlator. This commensal observing system greatly expands the science output of those antennas by adding the low frequency system with no additional resources needed from the VLA system. VLITE system is expected to obtain more than 3000 hours per year on-the-sky at P band. The primary science drivers for VLITE are ionospheric science and astrophysical transients. We present an overview of the VLITE project and current status.
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