

Optical communications for deep space cubesats

Freedom from spectrum regulations makes optical communications attractive for cubesat data returns. Although implementing an optical communications downlink from a near-Earth orbit is challenging, closing an optical link from deep space ranges (technically greater than 0.0133 AU, but in practice generally greater than 0.5 AU) is truly formidable. The approach at JPL to combine knowledge from a state-of-the-art attitude determination system with precision beam pointing and a novel transmit laser modulation scheme to a large aperture (1 to 10 m) ground receiver outfitted with an array of single photon detectors. We shall present our laboratory results of tests with prototype optical pointing and photon starved communications link testbeds, including demonstrated acquisition and signal tracking performance.