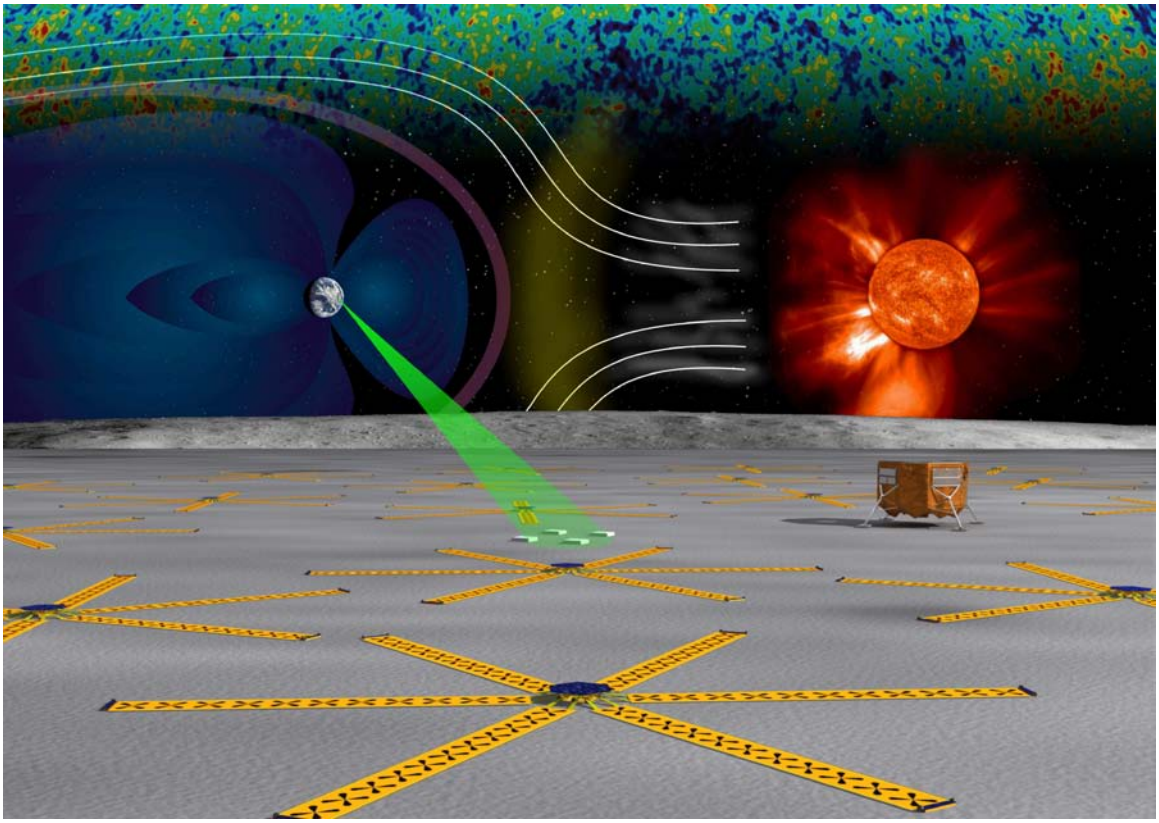


Exploring the Cosmos from the Moon

Jack Burns, University of Colorado at Boulder

The Moon is a unique platform for fundamental astrophysical measurements of gravitation, the Sun, and the Universe. Lunar Laser Ranging of the Earth-Moon distance provides extremely high precision constraints on General Relativity and alternative models of gravity. Lacking a permanent ionosphere and, on the farside, shielded from terrestrial radio emissions, a low frequency (<100 MHz) radio telescope on the Moon will be an unparalleled observatory for probing myriad cosmic phenomena from the Sun to galaxy clusters to the very early Universe. Crucial stages in the acceleration of high energy particles near the Sun, which will be harmful to astronauts exploring beyond the Earth's immediate environs, can be imaged and tracked with the lunar radio telescope. The evolution of the Universe during and before the formation of the first stars, black holes, and quasars can be traced for the first time with a farside low frequency radio array. Extended radio structures produced by colliding galaxy clusters can similarly be imaged with such a powerful array of telescopes. The NASA Lunar Science Institute at the Ames Research Center recently funded a multi-university center dedicated to the study of Astrophysics from the Moon and headquartered at the University of Colorado. In this talk, I will describe how future observatories on the Moon will explore some of the most exciting problems in astronomy and astrophysics.