Implementing Radio Experiments in Space

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By virtue of the relative transparency of the atmosphere at radio wavelengths and the large apertures that have been required, radio astronomy has been largely pursued from the ground. There have been notable exceptions, such as the Radio Astronomy Explorer series and the space VLBI efforts of HALCA and RadioAstron. More recently, there has been an increase in interest in space-based radio astronomical observations, motivated by diverse scientific and technical advances. The scientific advances include new developments in cosmology and astroparticle physics, and the technical advances include the advent of more capable small satellites, including cubesats. This tutorial approaches space-based radio astronomy from the perspective of the different considerations for a space-based experiment or mission relative to a ground-based observation, aiming to answer the question, "You have this idea and you want to go to space?" The tutorial will be based on experience from various radio experiments on both Earth science and planetary science missions, including the Gravity Recovery and Climate Experiment (GRACE) and Gravity Recovery and Interior Laboratory (GRAIL) missions.

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