An overview will be given on recent and planned laboratory studies of dust charging near surfaces, and the characterization of near-surface plasma environments relevant to the Mars, Moon, asteroids and the dense ring system of Saturn. Previous experimental investigations in our laboratory included dust charging in a photoelectric sheath of emitting surfaces, charging due to emission of photoelectrons [1], contact charging from surfaces [2,3], triboelectric charging due to stirring and collisions [4], and charging in the plasma sheath [5]. The future objective is the identification of critical measurements needed to constrain and improve models of the behavior of dust in these environments and to help the mitigation of dust related hazards for future missions. Two instrument concepts and an experimental set-up are presented to accomplish this task: (a) A lunar surface module to measure the near surface plasma environment, dust impacts and dynamics; (b) an instrument to measure the size, velocity and charge distribution of wind entrained dust on Mars; (c) A set of laboratory experiments to study the adhesion and release of dust particles from surfaces under various conditions including the effect of exposure to UV radiation or solar wind plasma.

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