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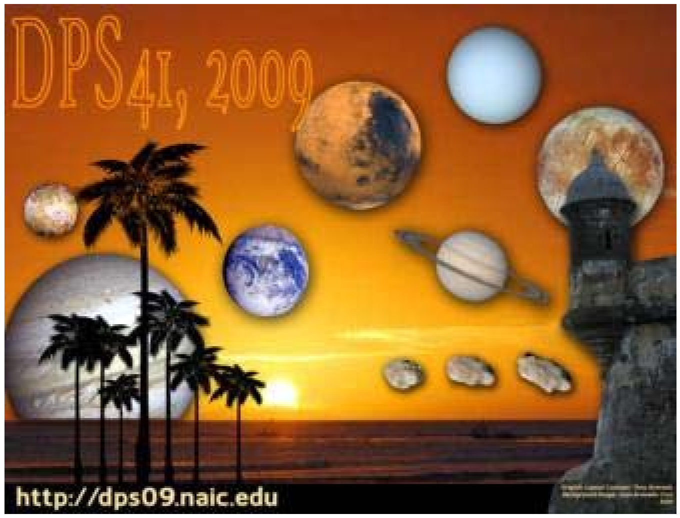

Presentation Abstract

Title **Impacts onto Icy Bodies: A Journey from the Laboratory to the Outer Solar System**

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Abstract Impact craters on icy bodies display a wide range of morphologies, some of which have no counterpart on dry rocky bodies. The unique features include a variety of fluidized ejecta forms and crater floor structures such as pits and domes. These morphological characteristics have been attributed to the subsurface distribution and thermal states of H_2O. In addition, crater depth to diameter trends on the icy Galilean satellites are thought to reflect the presence of subsurface oceans. If the physics of cratering in H_2O were well understood, then the observed features on icy bodies could be used to derive a wealth of information about the distribution of H_2O and thermal structure of bodies in the solar system.

I will summarize recent work on crater formation on Mars and icy satellites that rely upon the combination of laboratory experiments, numerical modeling, and observations. Shock wave experiments have provided fundamental information about the response of H_2O to an impact event. Numerical models of the equation of state and the temperature-dependent rheology of ice have been improved to capture essential physics during crater formation. Recent simulations of crater formation produce features similar to those observed on Mars and icy satellites and provide constraints on subsurface properties.

Much of what we see on icy bodies can be explained by following the phase changes. Ice is melted by very modest shock pressures. As a result, liquid water may be produced during impacts onto ice throughout the solar system. At lower shock pressures, ice does not melt but undergoes crystallographic changes between different solid phases. These phase changes affect the dynamics of crater formation and lead to observable features that are unique to H_2O.