

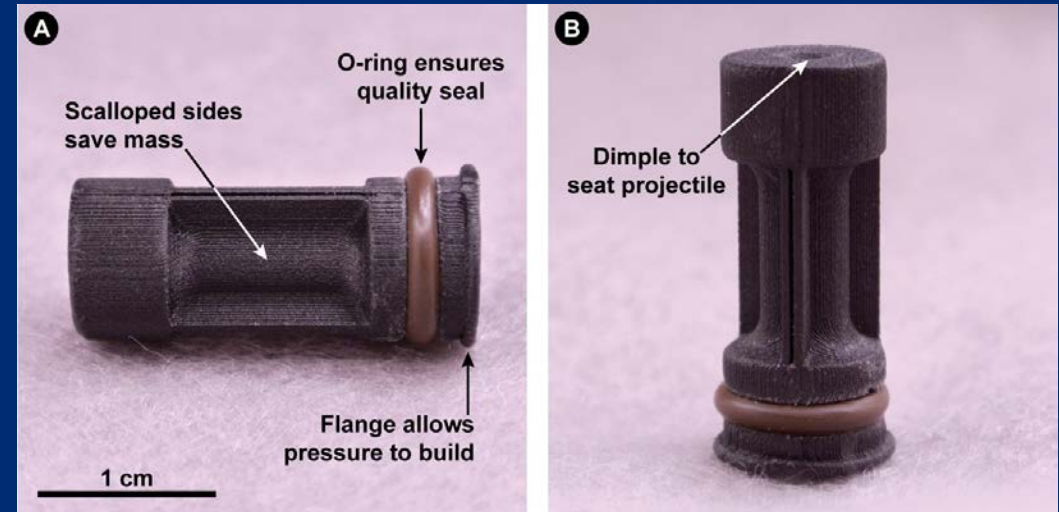
Recent innovations at the JHUAPL Planetary Impact Lab



The Planetary Impact Lab (PIL) at the Johns Hopkins University Applied Physics Laboratory (JHUAPL) includes a single-stage, compressed inert gas gun that can be used for impact experiments.

Impact angle can be varied from 15° to 90° with respect to horizontal, which enables oblique impacts into granular materials (e.g., regolith analogs). The gun achieves impact velocities up to 400 m/s, although enhancements could increase the maximum projectile velocity. Impact chamber pressures can range from ambient pressure down to ~ 75 Pa.

The PIL gun is currently being used to investigate impact processes with application to planetary science.



The PIL gun uses sabots, shown here, produced with state-of-the-art additive manufacturing ("3D printing") techniques (AM). Several engineering challenges had to be overcome to create a reliable AM sabot; however, these new sabots are $\sim 45\%$ lighter than and provide substantial cost savings over machined sabots. This figure shows (A) a sabot lying on its side and (B) a sabot standing on its rear flange.

The JHU/APL Planetary Impact Lab developed an 3D-printed sabot for use in high-velocity gun experiments, an innovation that provides significant mass and cost savings compared to sabots manufactured using traditional techniques.