## WRANGL=R

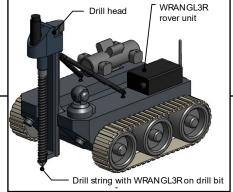
#### Water Regolith ANalysis for Grounded Lunar 3d Reconnaissance

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**R&D Approach** 

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Concept design of WRANGL3R on a micro-rover



### **Development Objectives**

In this LuSTR project our team will [1] Design, assemble and validate a breadboard; [2] Design and integrate a prototype with a drill bit and bench test; and [3] Design a TRL5 WRANGL3R

Challenges include design of a new miniaturized type of laser and optical path that performs under drill vibration & percussion

WRANGL3R brings a very powerful instrument to the subsurface, as opposed to bringing subsurface samples to an instrument

WRANGL3R includes unproven innovations at TRL2. This project will deliver a proof of concept, moving the concept to TRL4

# Impact and Infusion

#### Requirements Review \_WRANGL3R at TRL 4 Breadboard assembled Breadboard Assembly and Testing Miniaturized design and drill integration Path to flight design Year 2 Year 1 Washington U. St. Louis Washington U. St. Louis Science validation using analog lunar Combined Final Procure/fab. Laser Requiren drill/LIBS assembly/test regolith, ice, volatile samples reporting laser optics Impossible Sensing Impossible Sensina Assemble/test Integrate laser Path to flight Miniaturize laser Spectrometer, with drill auger TRL 5 design optical path fab. optical path housing

WRANGL3R will advance lunar exploration by bringing first-time observational and analytical capabilities to small rovers: rapid, direct, depth-resolved downhole quantitation of water content while drilling

Following LuSTR, we will propose to DALI, pre-phase A, PRISM, and/or CLPS to initiate assembly of a flight instrument

WRANGL3R approach to resource characterization and mapping in lunar regolith can be included in a future lunar ISRU strategy