EXPLORATION OF THE SCHRÖDINGER PEAK-RING BASIN ON THE LUNAR FARSIDE. David A. Kring[1], Jack O. Burns[2], Joshua B. Hopkins[3], Scott Norris[3], and T. Joseph W. Lazio[4], [1]Center for Lunar Science and Exploration, USRA-Lunar and Planetary Institute, Houston TX 77058 (kring@lpi.usra.edu), [2]Center for Astrophysics and Space Astronomy, University of Colorado, Boulder CO 80309, [3]Lockheed Martin Space Systems, Denver CO 80127, [4]Jet Propulsion Laboratory, Pasadena CA 91109.

Introduction: A multi-year assessment of the NRC's report outlining *The Scientific Context for Exploration of the Moon* [1] produced a global landing site report with locations where those scientific objectives could be addressed [2]. The landing site report concluded that the Schrödinger peak-ring basin is one of the scientifically-richest landing sites on the Moon.

That study prompted a closer look at the geology of the Schrödinger basin for mission opportunities. Within the context of the Constellation Program, in which astronauts would land and be able to explore with a Lunar Electric Rover (LER), three landing sites with traverses and sample stations were designed [3]. Subsequently, with the addition of M^3 and LROC data, outcrops of distinct lithologies were identified [4, 5].

The mission paradigm has changed, however. At the moment, the capability to land astronauts on the surface is not being developed. The Orion Multi-Purpose Crew Vehicle, however, is being prepared for an Exploration Flight Test (EFT)-1 on a Delta IV in September 2014. Exploration Mission One (EM-1) with Orion on the Space Launch System (SLS) is scheduled for 2017; this is an un-crewed flight around the Moon with a free return trajectory. EM-2 follows in 2021 with a crewed lunar orbit-capable system.

Lunar L2-Farside Mission: The Orion has the capability for a mission that operates within view of the Schrödinger basin on the lunar farside [6]. In this type of mission, astronauts would be sent to an orbit around the Earth-Moon L2 point ~60,000 km above the surface. In parallel, a robotic asset could land within Schrödinger basin and collect samples for return to Earth. The lander and rover would maintain contact with Earth through Orion (Fig. 1). Moreover, astronauts on Orion could teleoperate the vehicle to reduce mission risk, enhance scientific return, and test operational concepts for future missions.

Objectives: The Schrödinger basin is located in what is likely to be the modification zone of the South Pole-Aitken basin. Schrödinger is the second youngest basin, within the oldest basin, so a sample return mission to that location has the potential of determining the duration of the basin forming epoch and addressing the two highest science priorities in the NRC [1] report. The basin-forming impact uplifted material from great depth, producing a peak ring of crystalline rock massifs suitable for testing the lunar magma ocean hypothesis.

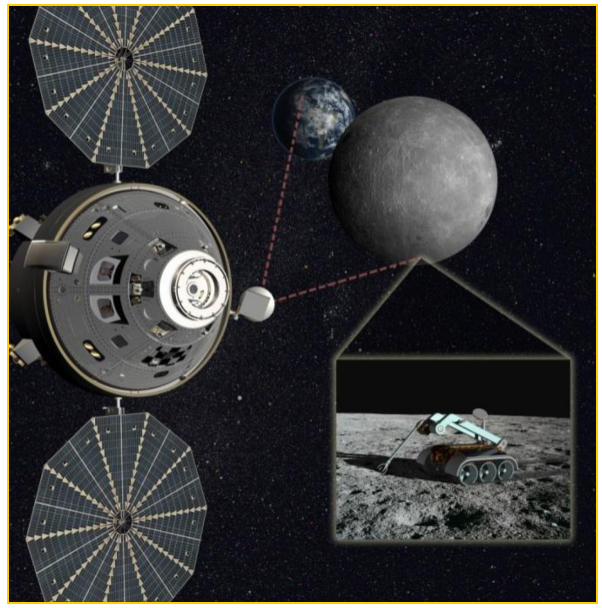

Fig. 1. Schematic picture of the Orion MPCV L2 mission in which astronauts teleoperate a rover on the lunar farside.

That material, when combined with material within impact breccias and exposed in the basin walls, will provide a cross-section through a substantial portion of the lunar crust. Magmas eventually erupted onto the basin floor, producing mare basalt flows and a spectacular pyroclastic vent, providing an opportunity to probe the thermal and magmatic evolution of the Moon's mantle. The pyroclastic vent may have important in situ resource utilization (ISRU) potential too.

Schrödinger is so large and such a scientifically rich site that multiple mission opportunities exist there. In addition to the geologic objectives described here, it is an excellent site for the deployment of a low radio frequency telescope to detect the effects of the Universe's first stars and galaxies on the intergalactic medium [6].

References: [1] National Research Council (2007) *The Scientific Context for Exploration of the Moon*, 67p. [2] Kring D. A. and Durda D. D., editors (2012) *A Global Lunar Landing Site Study to Provide the Scientific Context for Exploration of the Moon*, LPI Contrib. No. 1694, 688p. [3] O'Sullivan K. M. et al. (2011) *GSA Spec. Pap., 477,* 117–127. [4] Kramer G. Y. et al. (2013) *Icarus*, *223*, 131–148. [5] Kumar P. S. et al. (2013) *JGR*, *118*, 18p., doi:10.1002/jgre.20043. [6] Burns J. O. et al. (2013) *J. Adv. Space Res.*, in press.