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Pluto: the next frontier for studies of condensed matter

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In July this year, the NASA New Horizons spacecraft completed an historic flyby of the Plutonian system, the first spacecraft to visit Pluto. The long-awaited data from this mission will take months to be returned in full to Earth. However, the wealth of data received so far, although small in volume, is already providing amazing insights into the surface morphology and geochemistry of Pluto and providing important clues into the inner workings of this dwarf planet.

New Horizons is equipped with high resolution imaging cameras as well as geochemical equipment to investigate surface and atmospheric compositions. Using a combination of geological mapping, geochemical data and other physical measurements, planetary scientists aim to determine the processes that shape the interior and surface of Pluto and other outer solar system objects.

In situ studies of the materials found on bodies within the outer solar system is an emerging area, both for planetary science and for research in Australia. The conditions of the icy satellites are simulated while data, typically diffraction, (X-ray or neutron), or IR data, is recorded. The observations and material properties obtained in these studies can then be used as a comparison to spacecraft data or an input to models of geological processes.

This contribution will include a background introduction to the New Horizons mission, an overview of the findings and data so far, and a discussion of how structural condensed matter studies, particularly synchrotron and neutron studies, can unlock the processes that govern the outer solar system.

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