For Exploration class missions, there is extraordinary premium on compact and reliable active detection systems to meet very stringent size and power requirements. Miniaturized electronics for radiation pulse processing would be important to help reduce size/power needs. Very small technologies (chips) are developed by the computer industry that may be adaptable to process radiation induced pulses from detectors to provide multi-channel analysis (MCA) and other analysis functions with very low power and size requirements. This is a need for NASA as power and size requirements are severely tightened on future missions to the Moon and beyond. Advanced technologies up to technology readiness level (TRL) 4 are requested in this area.

The miniature processor must not exceed 0.2 W of power and have a volume not to exceed 20 cc. A communication interface, such as USB or other serial interface, is required. A fast clock rate is required, not less than 100 MHz. An analog-to-digital converter, minimum sample rate of 10 M samples per second. Could be part of chip or on the same board with chip. Requires adequate pulse height measurement to perform MCA, e.g., peak hold, digital waveform processing, or other approach. MCA should cover the input pulse height range of .002 to 10 volts (or equivalent) in either 100 channels on log scale or in two linear spectra of not less than 250 channels each with different gains.