Particle Induced X-ray Emission at Mercury and the Moon.

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Mercury and the Moon are examples of terrestrial bodies which lack an atmosphere and therefore have surfaces which interact directly with the space environment. Thus the surfaces can be reprocessed by plasma impact, and in the process can emit X-rays via the Particle Induced X-ray Emission (PIXE) process. We will present and review existing measurements, particularly from SMART-1 and Chandrayaan at the Moon, and Messenger and Mercury, in order to predict opportunities for new science at Mercury by BepiColumbo. We will present predictions of PIXE signals from different regions of the Mercury surface, and examine the possibility of using the signal for direct diagnosis of particle interactions with the surface. These include the auroral signatures of substorm like behaviour, and interactions with coronal mass ejections.