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The Paris-Edinburgh Press at PETRA III, DESY: A tool for experiments on liquids at high pressure and temperature

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Melts or magmas play an important role for the chemical evolution of terrestrial planets, particularly for the formation of the crust. Many of the related geological processes are directly controlled by the physical and chemical properties of melts, that vary across the complete range of conditions from the surface to the core-mantle boundary and are controlled by the melt structure. Here, we introduce the successful implementation of a large-volume Paris-Edinburgh press at the Extreme-Conditions Beamline at PETRA III, DESY, Hamburg that was successfully used up to more than 5 GPa and 2300 K. This apparatus provides unique opportunities for studying density, viscosity and structure of melts. Two examples will illustrate the capabilities: (i) An XRD study on the structural properties of Ca-Na-Sr-carbonate melts up to 3 GPa. (ii) A study on the density of lunar silicate melts using the X-ray absorption method up to pressures of the moon's core-mantle boundary. Strength, limitations and availability for the scientific community will be discussed.