# Electrons at Venus, Mars and Titan

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Earth, Venus, Mars and Titan are all objects with significant atmospheres and ionospheres. Ionospheric studies at the Earth first revealed the presence of ionospheric photoelectrons, a product of the principal ionization process for the ionosphere, i.e. photoionization from solar EUV and X rays. Recent space missions with suitable instrumentation have also revealed similar photoelectrons at Venus, Mars and Titan. The instrumentation involved were the electron spectrometers of Aspera 4, Aspera 3 and Cassini respectively, all of which had sufficient energy resolution for these studies. In all these cases, photoelectrons are also seen far from the object: in the tails of Venus (Coates et al. 2008, 2010, Tsang et al. (under review, 2010), Mars (Coates et al., 2010) and Titan (Coates et al., 2007, Coates 2009, Wellbrock et al. in preparation 2010). Here we review the observations of photoelectrons at these objects, concentrating particularly on the distant photoelectrons, and compare with Earth. We also discuss how these may be used as tracers of a magnetic connection to the ionosphere in each case.

Keywords: Venus; Mars; Titan; Ionospheres; Photoelectrons (maximum limit of 20 keywords).

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