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Motivation - Curiosity

What is the largest electron Differential Energy Flux (DEF) spectrum in the largest electron energy channels that the electron plasma instrument on the Mars Express spacecraft measured during its 10+ years of operation?
Procedure

Examine each spectrum to record the largest single value of DEF and the largest average value of DEF in the following energy ranges: 
\(~150 – 500 \text{ eV}, 500 – 1000 \text{ eV}, 1 – 5 \text{ keV}, \text{ and } 5 – 10 \text{ keV}.\)
## Results

### Times Where the Spectra Occur

#### Mars

<table>
<thead>
<tr>
<th>Energy (keV)</th>
<th>0.1 - 0.5</th>
<th>0.5 - 1.0</th>
<th>1.0 - 5.0</th>
<th>5.0 - 10.0</th>
</tr>
</thead>
</table>

#### Venus

<table>
<thead>
<tr>
<th>Energy (keV)</th>
<th>0.1 – 0.5</th>
<th>0.5 – 1.0</th>
<th>1.0 – 5.0</th>
<th>5.0 – 10.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak DEF</td>
<td>2011-309 07:00:22</td>
<td>2011-309 07:00:22</td>
<td>2011-309 07:00:22</td>
<td>Noise</td>
</tr>
<tr>
<td>Average DEF</td>
<td>2011-309 07:00:22</td>
<td>2011-309 07:00:22</td>
<td>2011-309 07:00:22</td>
<td>Noise</td>
</tr>
</tbody>
</table>
Electron Data at Mars

Location of the largest Electron DEF spectrum

MEx ELS-07  September 18, 2005

Spacecraft Solar Time [hour]

Log (ergs/cm²-sr-sec-eV)

DEF

MEx

BS

MPB
Electron Data at Venus

Location of the largest Electron DEF spectrum
Mars SPICAM “Aurora”

Location of SPICAM enhanced “Auroral” signature

Log Electron Energy [eV]

Spacecraft Solar Time [hour]

DEF

Log [ergs/cm**2-sr-sec-eV]
Conclusions

* The shape of the largest DEF electron spectrum is similar at Mars and Venus.

* The shape of the largest DEF electron spectra at Mars and Venus is similar to the electron spectrum detected during the times SPICAM detects “auroral” enhanced signatures. Since the magnetic field at Mars is chaotic, the largest DEF electron spectrum could be magnetically directed from the dayside to the nightside where it could precipitate causing the same “auroral” signature seen by SPICAM.

* The shapes of the largest DEF electron spectra at Mars, Venus and SPICAM “auroral” times, are similar to auroral spectra found at the Earth.
BACK UP
Earth DE-2 LAPI

Location of narrow auroral arc in 7.5° electron sensor

Next slide shows a blow-up
Location of narrow auroral arc in the 7.5° electron sensor of DE-2 LAPI