



Electron optical study of the Venus Express ASPERA-ELS Top-Hat Electrostatic Analyser

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Despite being identical in design, the performance of the Venus Express Electron Spectrometer is dramatically different from the nominal response shown by the ELS on Mars Express. While the mechanical tolerances of the electron optical elements were suspected as being different, before this study, the precise nature of the problem was unknown. The mismatch between the results of the experimental calibration and the nominal case could not be supported without a theoretical understanding of the fundamental instrument science behind the device. We have shown that a combination of a misalignment of the inner hemisphere and a wider than nominal aperture yields a response consistent with the experimental results. The resulting K-Factor, Geometric Factor and Energy Resolution in the simulation are now in good agreement with those observed experimentally. Therefore, there now exists a good agreement between both laboratory calibration data and computer simulation, giving a firm foundation for future scientific data analysis.