

# Laboratory measurements of the electron impact excitation cross section of Fe XVII x-ray transitions

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## Abstract

We have used a large-area, gain-stabilized microcalorimeter array built by the NASA-Goddard Space Flight Center and operated at Lawrence Livermore National Laboratory's electron beam ion trap to measure the electron-impact excitation cross sections for the dominant x-ray lines in the Fe XVII spectrum as a function of electron impact energy. The results reveal a consistent overestimation by recent calculations of the excitation cross section of the resonance transition, which is shown to be at the root of several long-standing problems associated with modeling solar and astrophysical Fe XVII spectra. These results establish a benchmark for atomic calculations frequently used to analyze high-resolution celestial spectra measured using the Chandra, XMM-Newton, or Suzaku X-ray observatories. Work by the U.C. LLNL was performed under the auspices of the D.o.E. under contract No. W-7405-Eng-48 and supported by NASA APRA grants to LLNL, GSFC, and Stanford University.

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