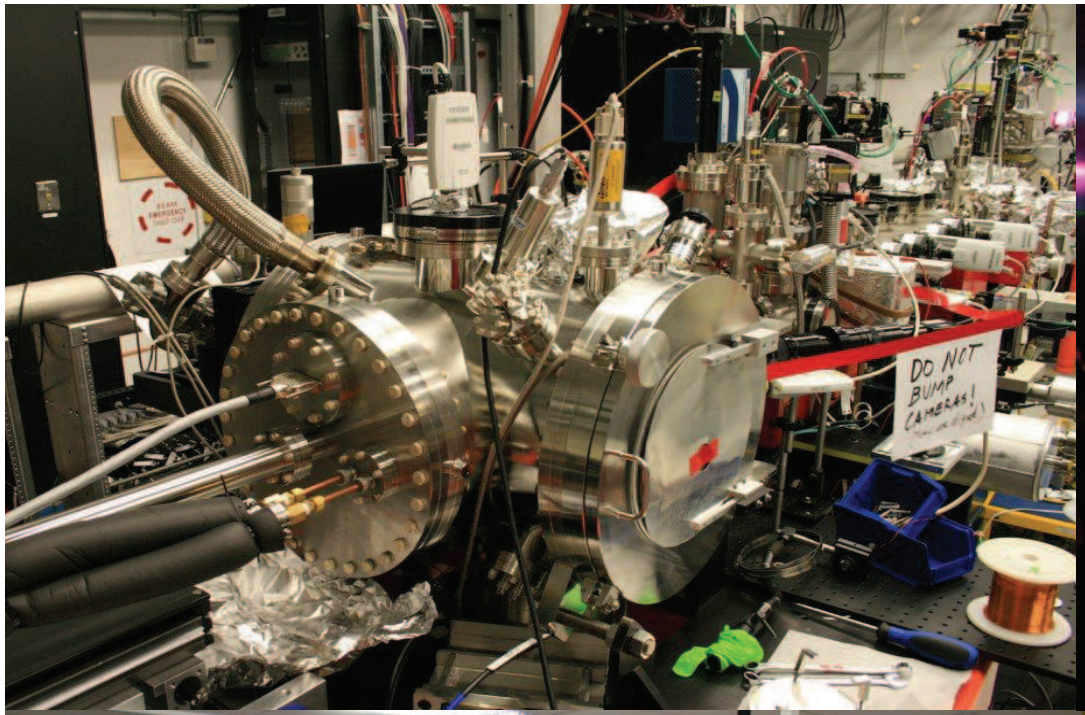
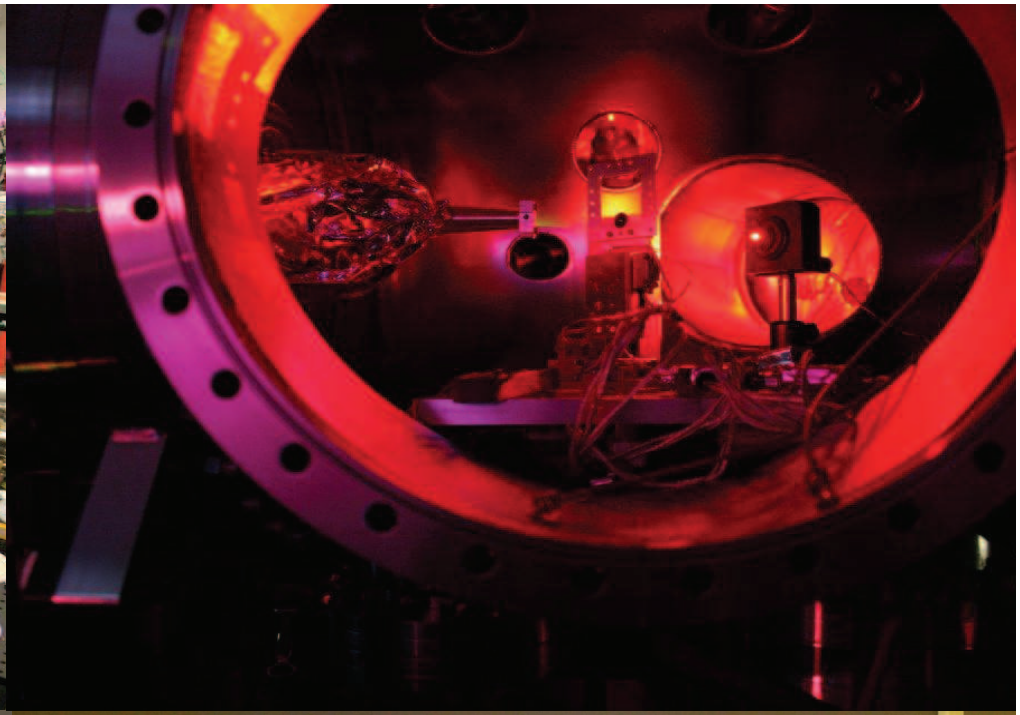
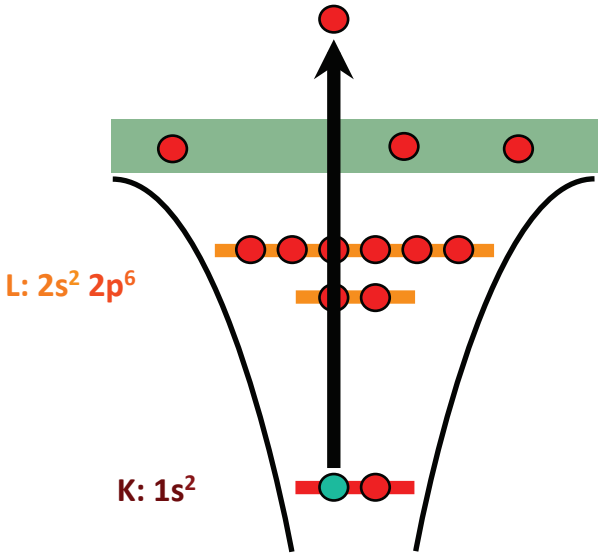

DO NOT
BUMP
CAMERAS!

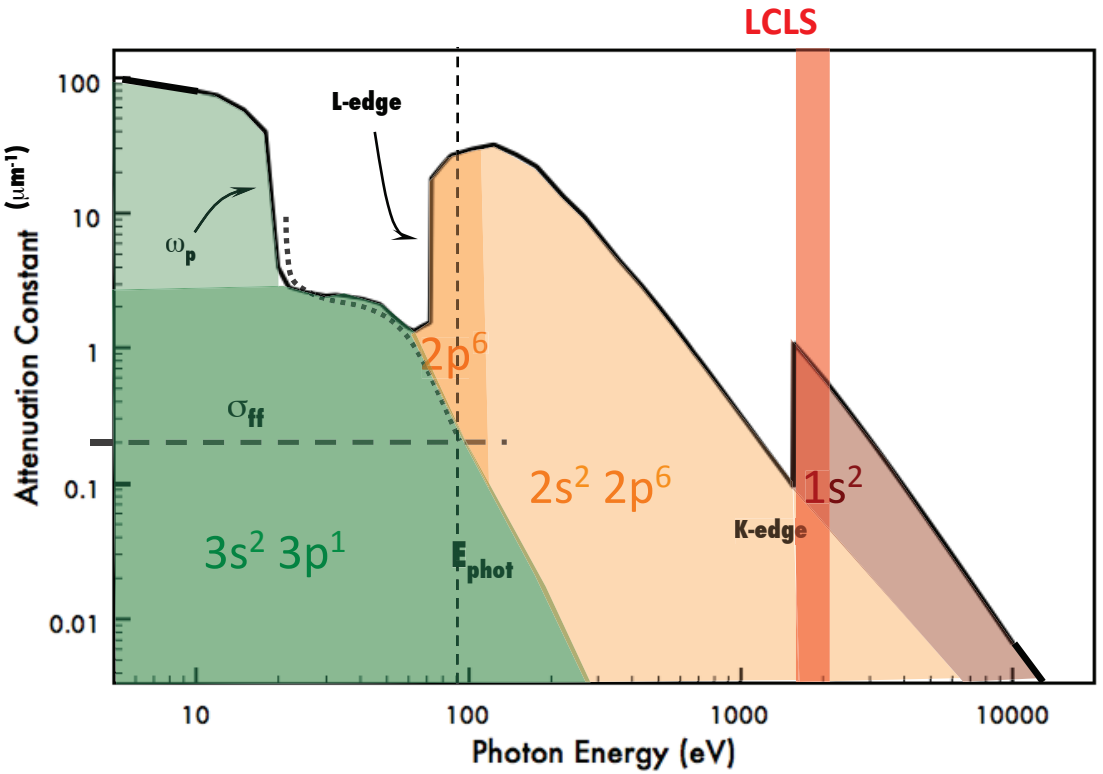


Electronic structure of Aluminium

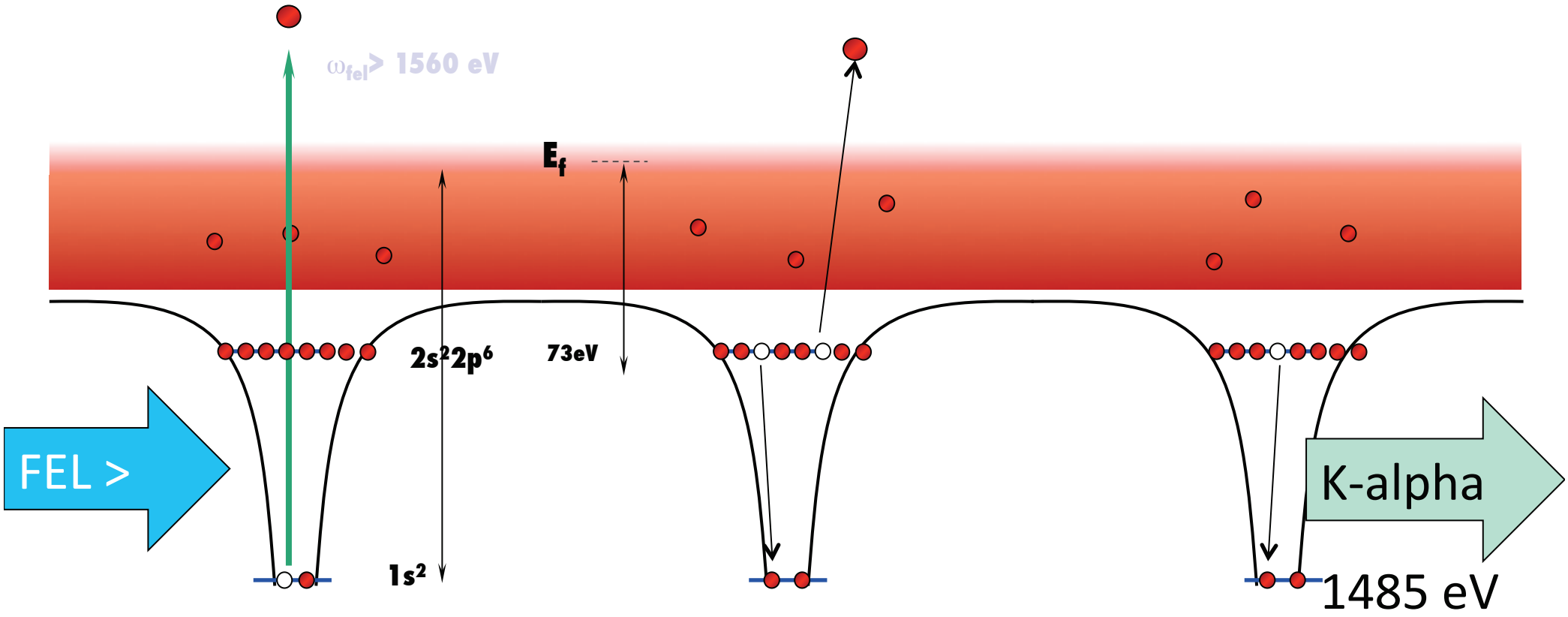
Neutral Al

Photo-excitation



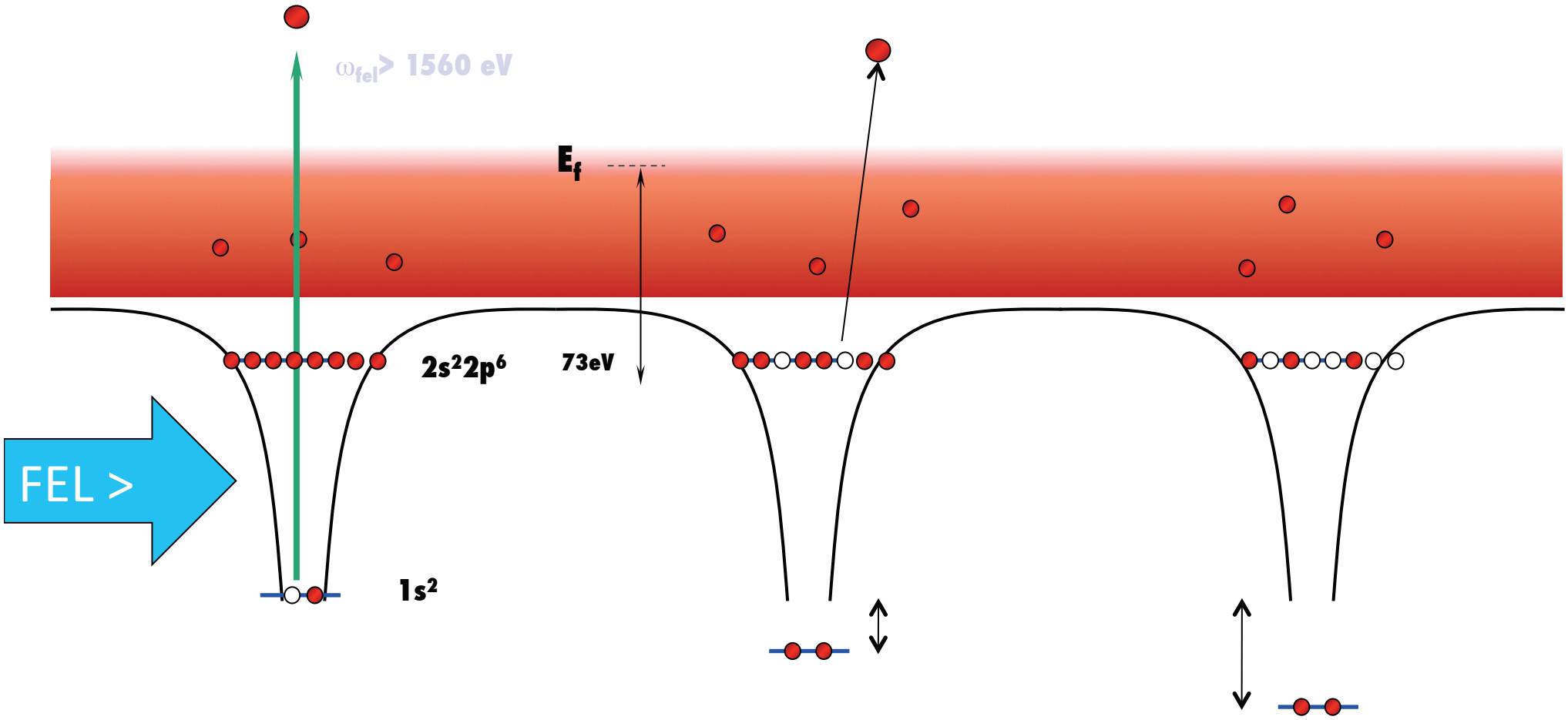


Auger rate 30 x Kα



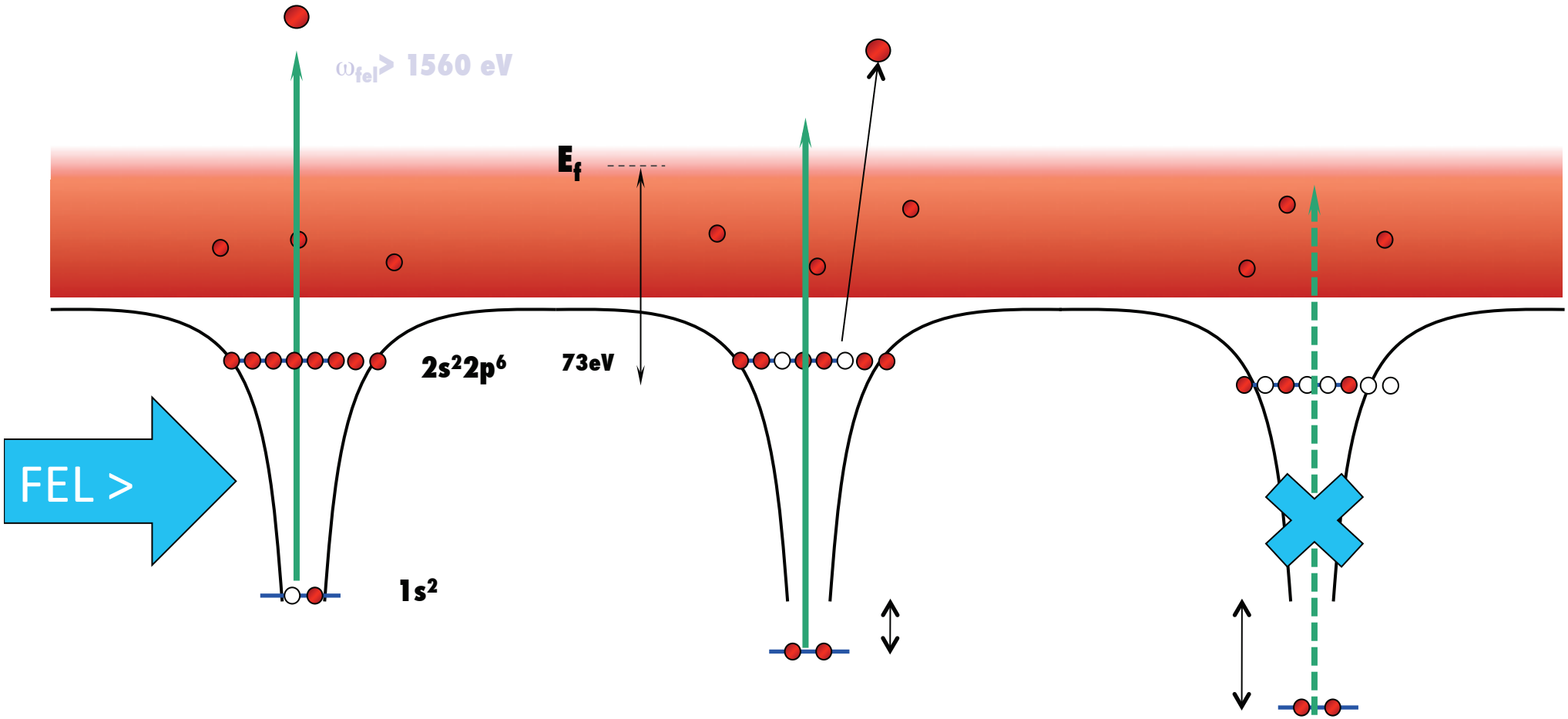
Note: The dominant Auger decay ejects two L-shell electrons for each input photon – exactly as Linda Young showed for Neon gas-jet experiments at LCLS .

K-edge/alpha shift



As the L-shell is ionized the K-electrons become more tightly bound. Both the K-alpha and K-edge shift to higher energies for higher charge states.

K-edge/alpha shift



As the L-shell is ionized the K-electrons become more tightly bound. Eventually, if the FEL photon energy was initially only just greater than the original K-edge, it can no longer excite core holes in the highly ionized states. LCLS is a PUMP and a PROBE.

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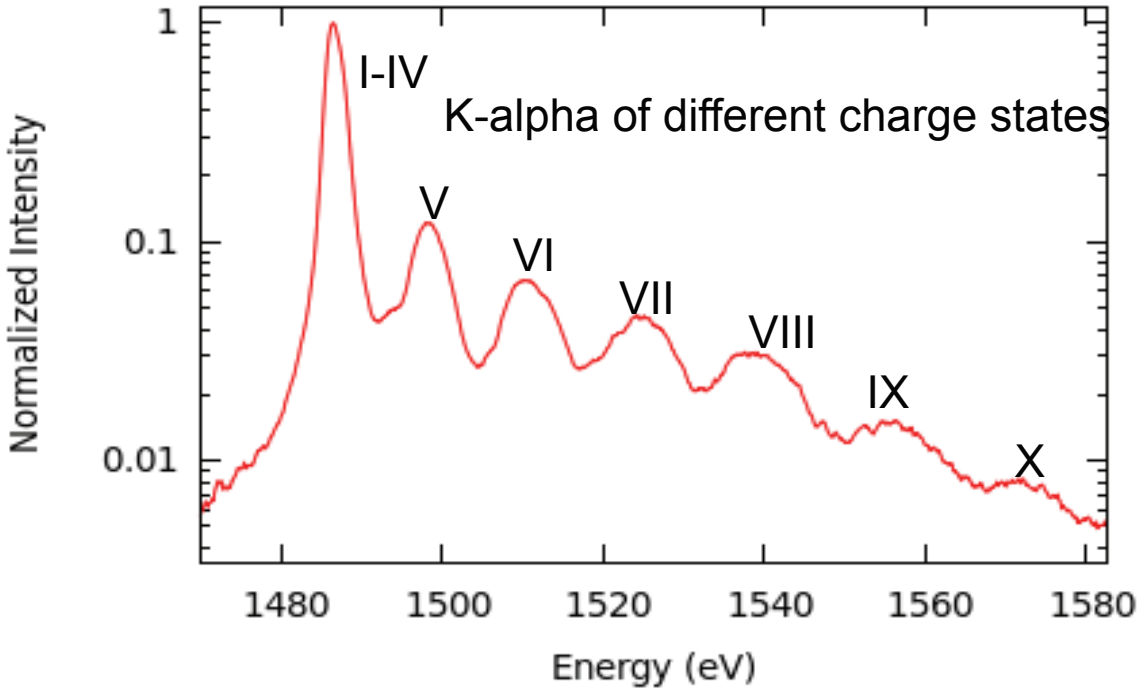
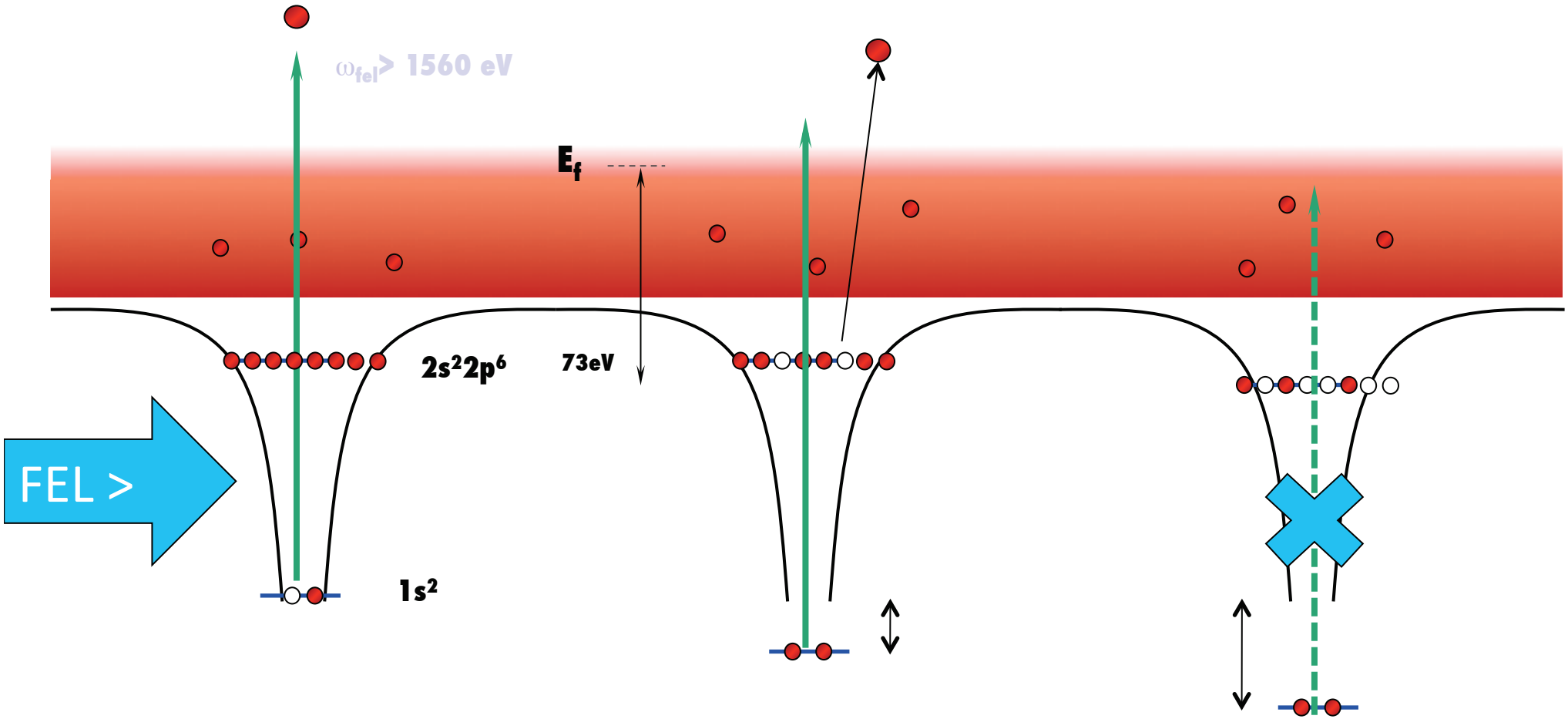
Experimental Spectra



Satellite spectrum

K-alpha emission from higher charged states

K-edge/alpha shift



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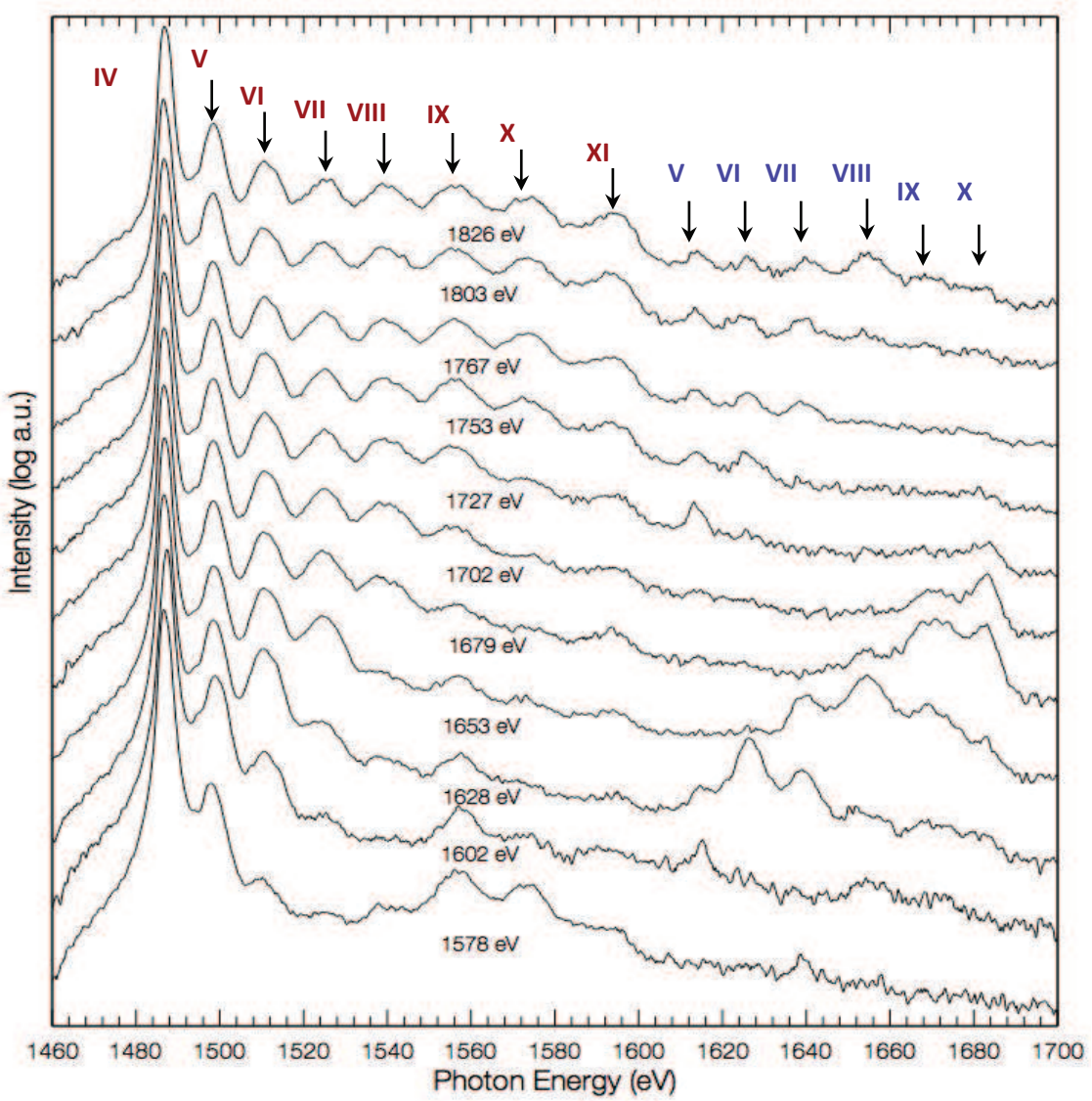
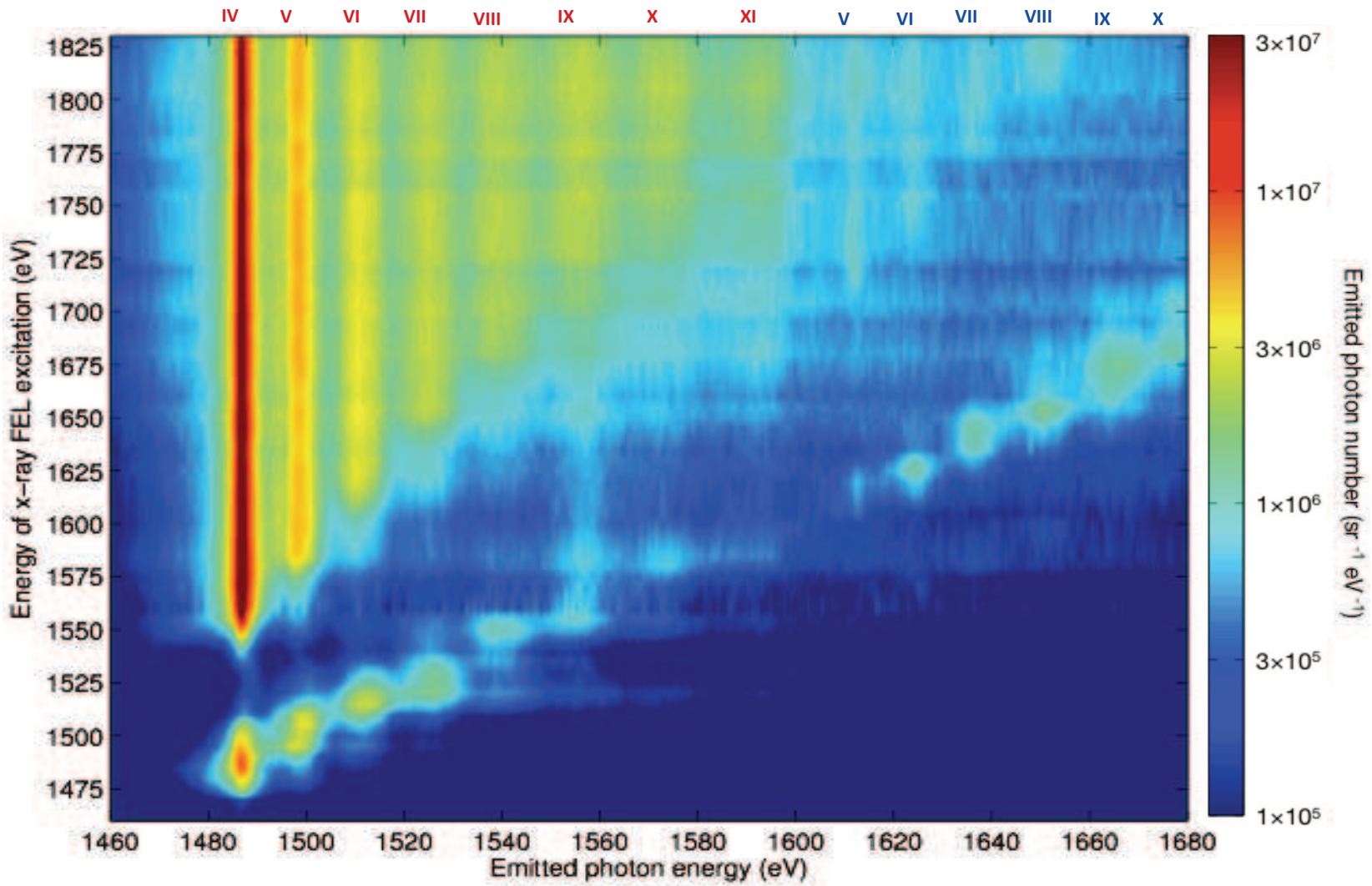
K-shell spectroscopy of Hot Dense Aluminium



K-shell spectroscopy of Hot Dense Aluminium



K-shell spectroscopy of Hot Dense Aluminium