

Fundamentals of X-ray Absorption Fine Structure Spectroscopy

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In this lecture I will introduce fundamentals of X-ray Absorption Fine Structure Spectroscopy. I will first use hand-waving arguments and cartoons to explain how the XAFS signal encodes information on the local structure around the absorbing atom. This part of the lecture is accessible to a broad range of students, including those with no background in quantum mechanics. I will then use a simple theoretical description, starting from Fermi Golden's rule, to highlight the sensitivity of the absorption probability to local structure. The derivation of the standard EXAFS equation will be explained for a simplified system. Finally, the sensitivity of XANES to electronic structure and coordination chemistry will be illustrated through a few examples of K-edge data on 3d metals.