

Introduction to Spectroscopy

Giorgio Margaritondo – EPF-Lausanne

Abstract

Synchrotron and free electron laser (FEL) sources provide photon beams of excellent quality for a wide variety of applications. Many of these applications fall in the broad class of “spectroscopy” – the techniques that analyze the products of the interaction with photons to extract information on the system under investigation. We will briefly review the conceptual background common to most spectroscopy approaches. Then, we will present the basic concepts of some of the most important synchrotron and FEL spectroscopy techniques: absorption and EXAFS, fluorescence, photoemission. We will specifically illustrate how the superior quality of the sources makes it possible to add spatial resolution to the experiments, transforming each spectroscopy into a spectromicroscopy. Finally, we will discuss how the forthcoming new FEL sources will impact this field. The basic objective of the lectures is not to exhaust the discussion of each technique but to provide the elementary background that will be expanded by other lectures.