

APE - Advanced Photoemission Experiment

The APE concept is based on providing a state-of-the-art surface science laboratory as a support facility for advanced photoemission experiments, using polarized Synchrotron Radiation in the ultraviolet and soft X-ray range.



APE is a **facility for advanced experiments on solid surfaces and nanostructured matter**. The all-UHV interconnected system includes state-of-the-art surface preparation and survey, atomic resolution STM microscopy and two beamlines delivering monochromatic, polarised synchrotron radiation to high-energy/angle resolution spectrometer and to a microscope allowing for soft-X ray absorption and magnetic dichroism, photoemission, Spin Polarization mapping and time-resolved measurements.

The beamlines use the synchrotron light from the Elettra storage ring in Trieste, Italy. Photons with chosen polarization are emitted simultaneously by two non-collinear insertion devices which illuminate two distinct beamlines (Fig. 1). The line dedicated to high-resolution photoelectron spectroscopy uses low energy photons ($h\nu=10-100\text{eV}$) (APE-LE, LE = Low photon Energy). The second line exploits photons in the range $h\nu=140-1500\text{eV}$ (APE-HE, HE = High photon Energy). The photon energy resolution after the APE-LE monochromator is better than $E/\Delta E=15000$. The first results on APE-HE indicate $E/\Delta E=10000$.

APE is designed to **operate independent experiments simultaneously** on both the LE and HE end stations, as well as growing samples and measuring their surface morphology by STM. Current tests confirm negligible amount of cross-talk between the two undulator sources. Substrates or samples can be loaded into the APE system via two differentially pumped load-locks and then transferred in UHV to and from any of the preparation chambers, to the STM and to both the synchrotron radiation spectrometers.

APE also allows the integration of users' specialized sample growth chambers or modules, which will be connected to the main sample distribution chamber and will have full access to the off-beam and on-beam facilities. Long term users' programs will be therefore

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possible, having access to beamtime based on usual assignment procedures, but having semi-permanent growth facilities and access to the off-beam diagnostics.

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