

XAFS at PETRA IV – What can be done?

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In recent years, several XAFS-beamlines were installed at low-emittance machines like DIAMOND Light Source, MAX IV, NSLS II, and PETRA III, among others. Plans for the future envision new sources with even lower emittance, which will result in a smaller beam and a higher coherence. At PETRA III, we have proven that it is possible to perform conventional XAFS experiments at a low emittance machine with an undulator. So far, we have worked with a rather large focus, but we are already planning to upgrade the optics with a KB-Mirror system for micro-focus applications.

In the long-term future, a new upgrade to PETRA IV will reduce the emittance and source size, and increase the coherent flux. This will not change the conditions for conventional XAFS with a rather large beam in the mm – sub-mm size, however, applications which require a micro- or even nano-focus will benefit significantly. Additionally, novel techniques which make use of the higher coherence of the incoming beam will be facilitated or even become possible at such a machine.

We will briefly describe the modifications of the accelerator to PETRA IV and the new beam parameters, and discuss different types of XAFS experiments – both conventional and novel, which will benefit from the significantly higher coherent flux at conventional X-ray energies and of the smaller source-size.