Design Status of the Ultra-Low Emittance Synchrotron Facility PETRA IV

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At DESY the Synchrotron Light Source PETRA III offers scientists outstanding opportunities for experiments with hard X-rays of exceptionally high brilliance since 2009. Research activities have been started to upgrade PETRA III to the ultra-low emittance source PETRA IV, which will be diffraction limited up to the hard X-ray range. Therefore the future light source PETRA IV will be ideal for 3D X-ray microscopy of biological, chemical, and physical processes under realistic conditions at length scales from atomic dimensions to millimetres. The lattice design is aiming for a horizontal emittance in the range between 10 pm rad and 30 pm rad at a beam energy of 6 GeV. Presently, two different approaches are considered for the lattice design: a design based on a hybrid multibend achromat with an interleaved sextupole configuration based on the ESRF-EBS design, and a lattice with a double non-interleaved sextupole configuration. The current status of the design activities are reported including the non-linear dynamics, intra-beam scattering and collective effects.