PETRA IV Workshop:
Extreme Conditions Research at the
Ultra-Low Emittance Storage Ring PETRA IV

October 16th noon – October 17th noon
Bldg. 99 (CFEL), Seminar Room III (ground floor)
DESY, Hamburg, Germany

Introduction:
DESY is planning to upgrade PETRA III to an ultra-low emittance storage ring reaching the fundamental limit of diffraction at 1 Angstrom, called PETRA IV. The new facility is expected to herald new science at extreme conditions using the diamond anvil cell (DAC) and large volume presses (LVP). Scientific case studies will benefit from: 1) Exceptional brightness as well as coherence (x100 more than PETRA III) enabling nano-sized beams with significant more flux on the sample at high energies, as well as 2) an entire suite of coherent diffraction and imaging techniques that have so far not been possible at high energies. In other areas, increased coherence and effective focusing together with fast high energy detectors will enable time resolved powder diffraction studies down to the 100 of kHz. Additionally, pink beam techniques accepting the full width of the very narrow harmonics (in comparison to PETRA III) will further enhance dynamic diffraction studies as well as microtomography. During the last 6 month the high-pressure community has been asked to help draft the Conceptual Design Report (CDR) for scientific case of PETRA IV. During the workshop the different science cases will be discussed with the community.

Monday October 16th		
12:45	Registration	
13:00 – 13:15	Welcome and Status of PETRA IV Planning	Ch. Schroer DESY
Session 1: Diffraction and imaging at other ultra-low eminence source ***Chair: H.-P. Liermann***		
13:15 – 13:55	Large-volume high pressure research at the APS: Current status and plans for the MBA upgrade	*Yanbin Wang* GSECARS, Uni. of Chicago
13:55 – 14:35	Extreme Conditions Science at the Extremely Brilliant Source	*Sakura Pascarelli* ESRF
14:35 – 15:15	Using Coherence at Extreme Conditions Science in the LVP at Soleil	*Eglantine Boulard* Institut de Minéralogie, de Physique des Matériaux et de Cosmochimie, Sorbonne
15:15 – 15:45	Coffee Break	

Session 2: Scientific Cases for the CDR of PETRA IV: Part 1 ***Chair: R. Farla***		
15:45 – 16:15	Unraveling complex processes in materials at extreme conditions: unique opportunities at PETRA IV	*Lars Ehm* Stony Brook University
16:15 – 16:45	Ultra-high pressure crystallography at PETRA IV: Perspectives and challenges	*Leonid Dubrovinsky* BGI
16:45 – 17:15	Precise determination of phase relations of mantle minerals by means of in situ X-ray diffraction in a large-volume press	*Tomo Katsura* BGI
17:15 – 17:45	Stress and microstructures under extreme conditions: advances and opportunities	*Sébastien Merkel* UMET - Université Lille 1
17:45 – 18:15	Volatiles in the Earth mantle: Studying the properties and behavior of H- and C-bearing phases in situ at PETRA IV	*Sergio Speziale* GFZ
18:15 – 19:00	Discussion	R. Farla, H. P. Liermann
19:00 – open	Dinner in the cafeteria	
Tuesday October 17th		
8:45 – 9:00	Coffee, Announcements	R. Farla, H. P. Liermann
Session 3: Scientific Cases for the CDR of PETRA IV: Part 1 ***Chair: H.-P. Liermann***		
9:00 – 9:30	Properties of silicate melts in the deep Earth: Challenges for in-situ studies with PETRA IV	*Max Wilke* Uni. Potsdam
9:30 – 10:00	Materials chemistry at extreme conditions	*Ulrich Schwarz* MPI CPfS
10:00 – 10:30	Discussion	R. Farla, H. P. Liermann
10:30 – 11:00	Coffee Break	
Session 4: Possible Implementation of Extreme Conditions CDR at PETRA IV ***Chair: O. Seeck***		
11: 00– 11:30	Extreme conditions research: science at the LVP beamline (P61.2)	*R. Farla* DESY
11:30 – 12:00	Extreme Conditions Beamline (P02.2) at PETRA IV	*H. P. Liermann* DESY
12:00 – 13:00	Discussion and Closing	R. Farla, H. P. Liermann