

Photon Emission Spectrometer for SASE3 beamline of European XFEL diagnostics



Anna Ayvazyan Supervisor: Dr. Joakim Laksman Scientist, X-ray Photon Diagnostics Group European XFEL, Schenefeld, Germany









- life activity
- European X-ray free electron laser (European XFEL)
- Photo-Electron Spectrometer (PES)
- How does PES work?
- Testing MCP detectors by measuring dark counts on all 16 detectors
- Testing settings on Helmholtz-coils with magnetometer for cancelling out stray magnetic fields
- Scenes for the PES device using Karabo software

#### **Summies**



#### Hamburger Kunsthalle





#### Inaugurated of Eu. XFEL and Family Party





In this picture, you can see the beam path of linear accelerator. Beam passes through the SASE3 undulator after which there is a PES. The European XFEL with its three undulators SASE1, SASE2, SASE3 (Self-Amplified Spontaneous Emission). generate coherent femtosecond pulses of X-ray radiation which will be used at the end station for different experimental technique.

## **Photo-Electron Spectrometer (PES)**







PES is equipped with 16 MCP (micro-channel plate ) detectors in a cylindrical configuration. In the TOF technique, kinetic energies are determined by measuring flight times, of electrons traveling a fixed distance between an interaction region and a detector, typically up to several hundred nanoseconds.



## How does PES work?





Beam passes through the SASE3 undulator after which there is a PES and after that the free electron laser comes in the center to the extraction region, XFEL lights hit atom in extraction region, and ionizes atoms which all in the center. Atoms emit electrons, electrons goes to one of 16 directions. There are four electrostatic lenses A B C D and after that is a detector, so it goes to the detector, and the signal from detector come out and we connect that with the digitizer where we measure the time difference from the start to the stop



# Testing settings on Helmholtz-coils with magnetometer for cancelling out stray magnetic fields









The objective is to have 0 magnetic field in the PES everywhere especially in the extraction region but also outside is important so for that reason we have to compensate the magnetic field rounding. To compensate that we have Helmholtz coils and the objective is find the current that give us 0 magnetic field in the center.



#### **Testing MCP detectors on all 16 tubes**





It was a slow ramping the MCPs up to 2100V, you can see the oscilloscope, which showed signal The scope we use is ROHDE&SCHWARZ RTB2002 Digital Oscilloscope 2.5 GSa/s.



## Scene for the vacuum and gas supply using Karabo software





Scene consists of scroll pump also known as scroll compressor and scroll vacuum pump, of valves, valves with controller, pre vacuum measure and upstream turbo parts, Nitrogen, Neon, Krypton and Xenon valves and gas boxes.





### **Thank You for Your Attention**



