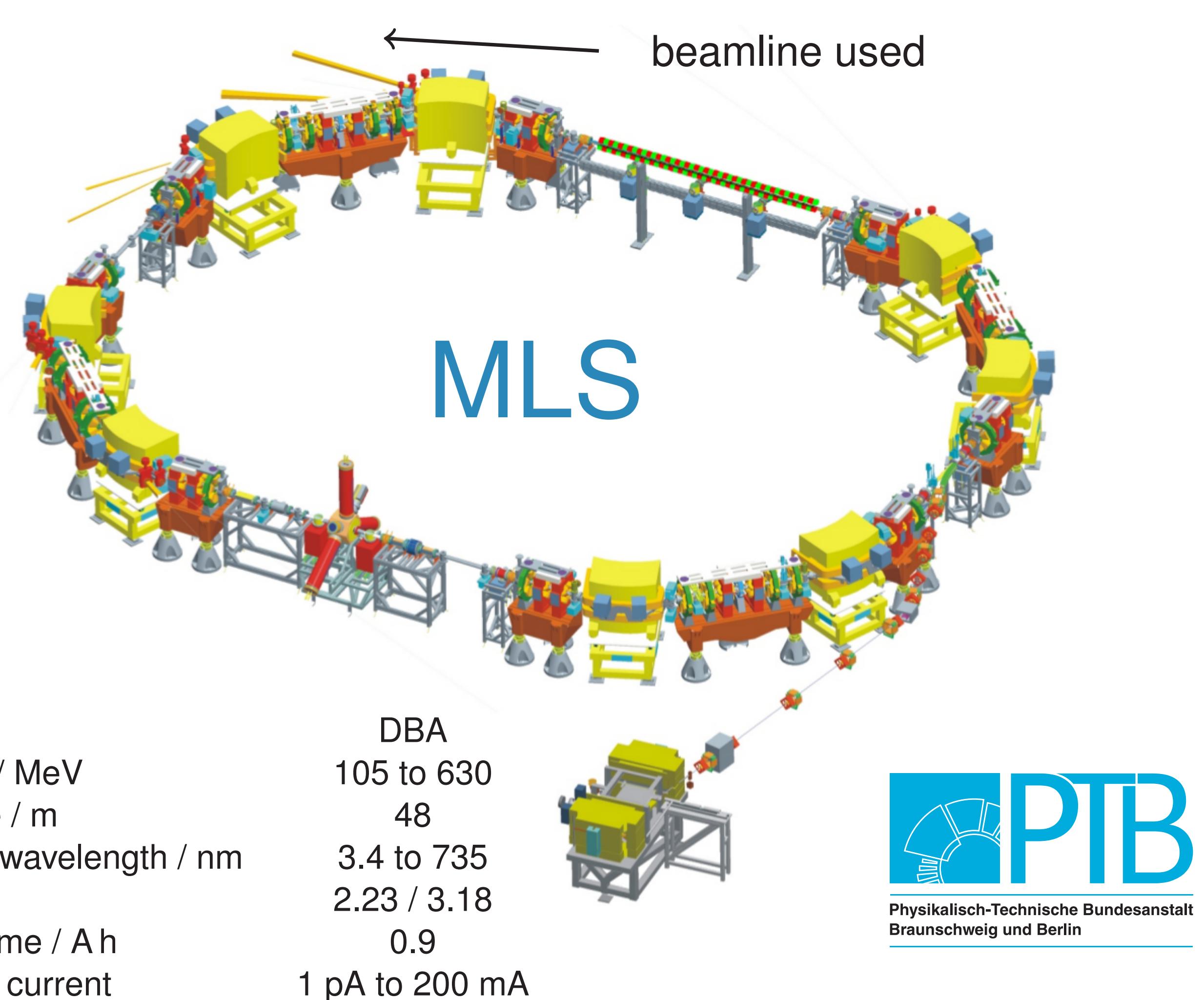


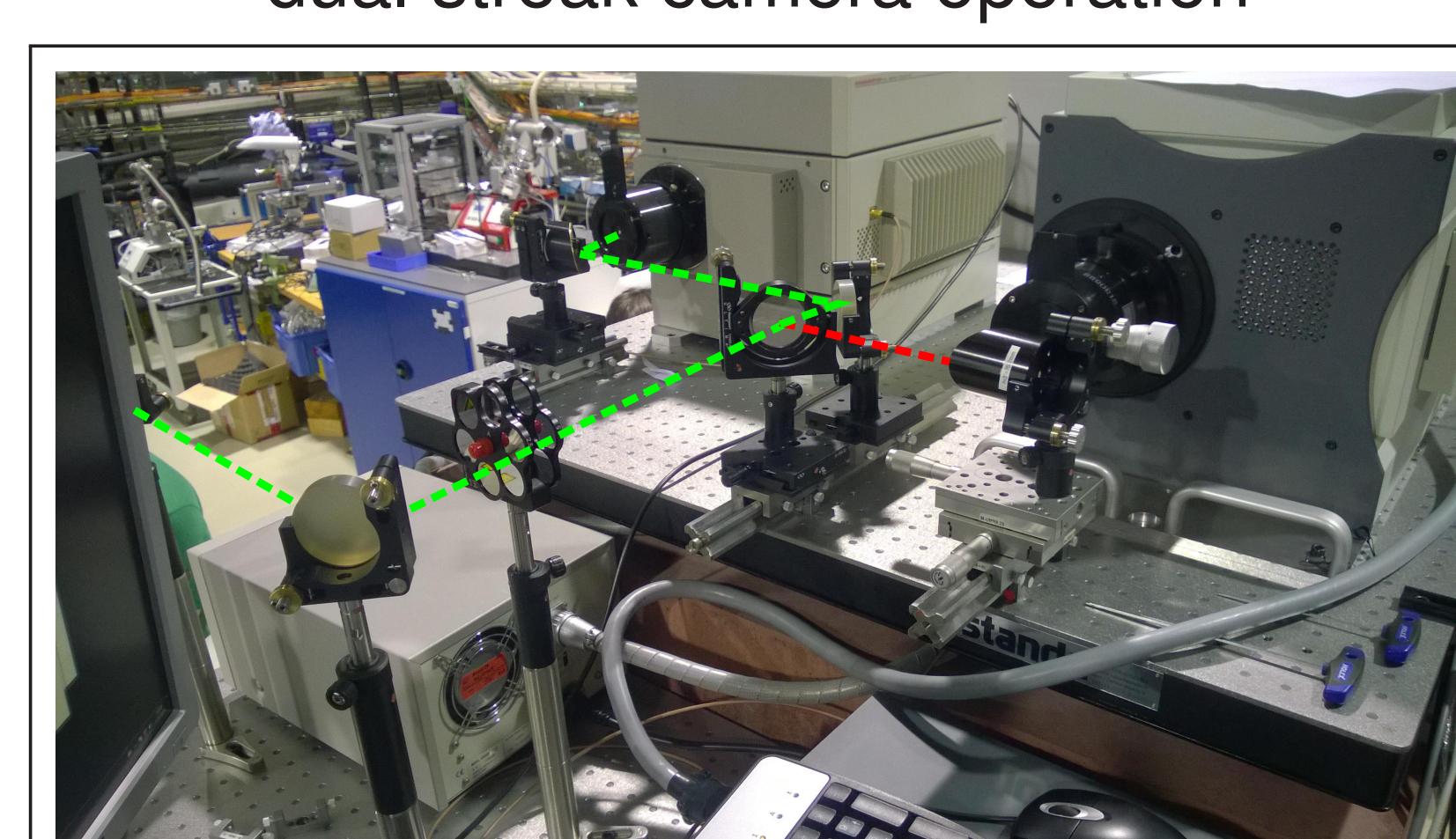
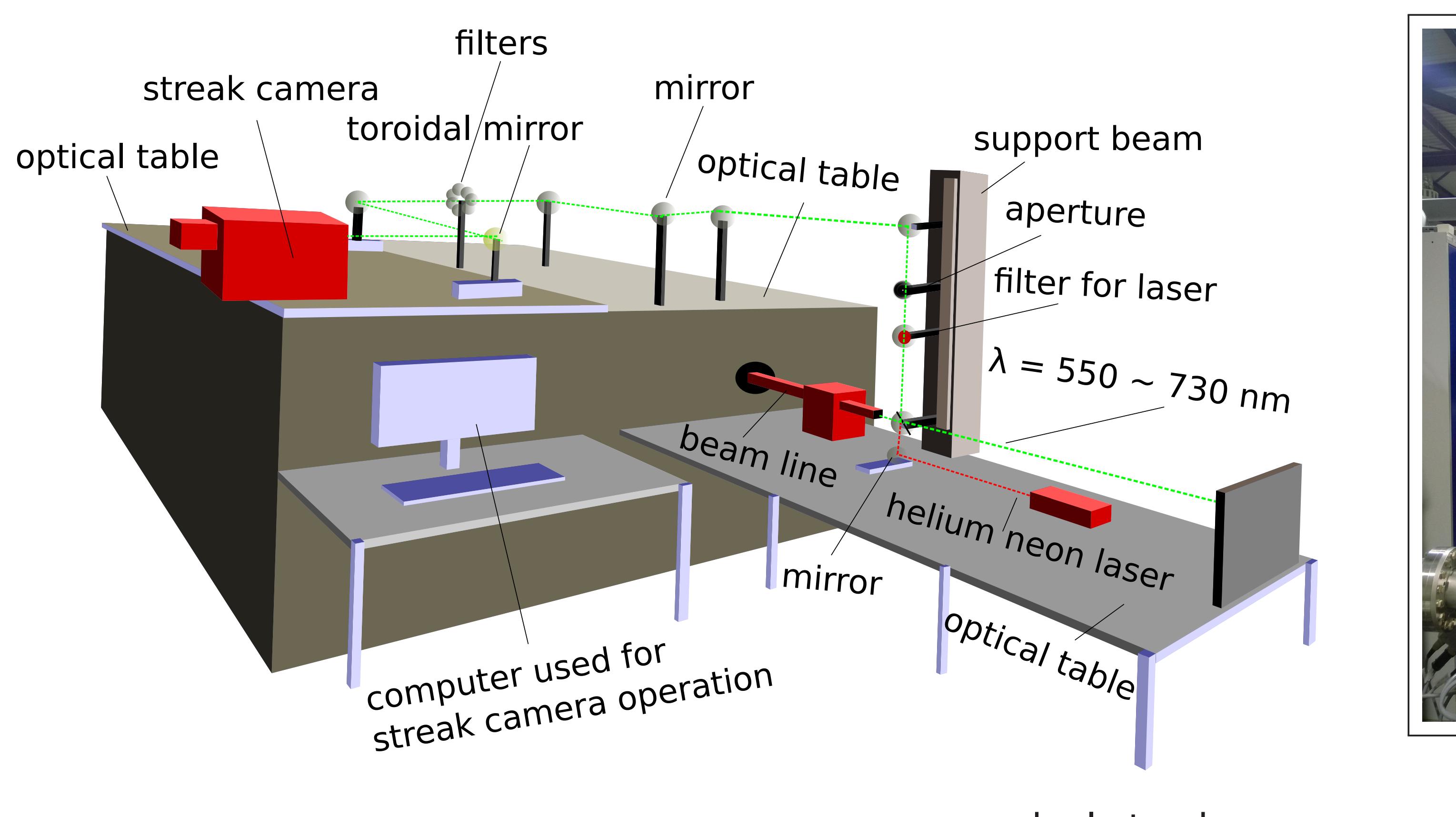
## Introduction

The Helmholtz-Zentrum Berlin is a facility that operates two synchrotron light sources: BESSY II and the MLS. One of the long term goals of this center is to continually make bunch lengths as short as possible in storage rings. A way to go about this is through lattice design by changing the momentum compaction factor. An important part of lattice design involves picking a good working point to avoid the tune resonances of the machine. A tune resonance program was therefore developed which can be used to view the current working point and resonance lines given only a few input parameters from the EPICS control systems.

In order to study shortest bunches, diagnostic tools are needed. A new streak camera was recently purchased for the MLS, and was setup at a beamline above the machine on the second floor. The setup proved to be quite a challenge because of the placement of the camera and beamline. An optical path that needed six degrees ( $x, x', y, y', z, z'$ ) of freedom was setup; this setup also provided the opportunity to operate the old streak camera along side the new camera simultaneously and compare measurements.

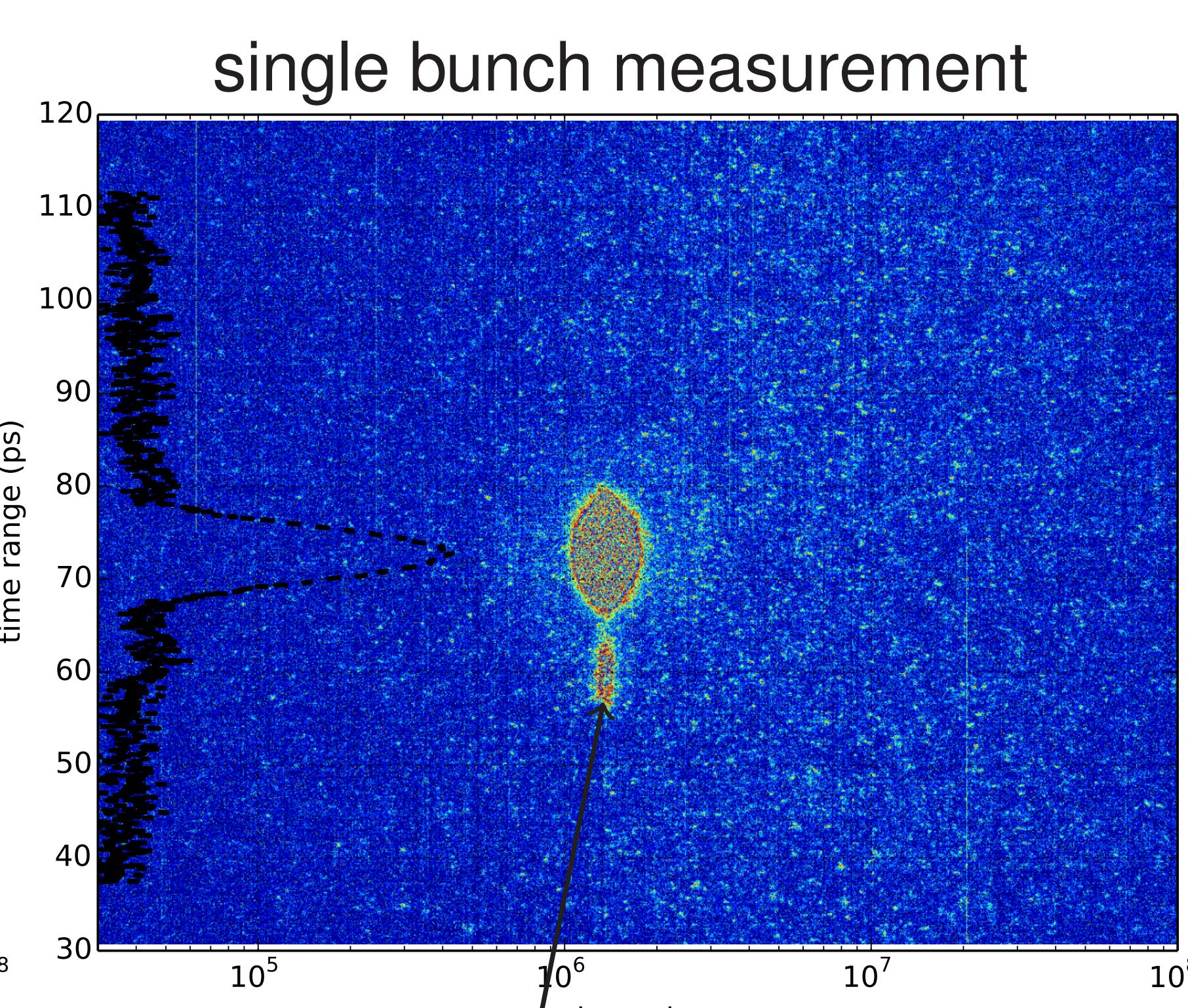
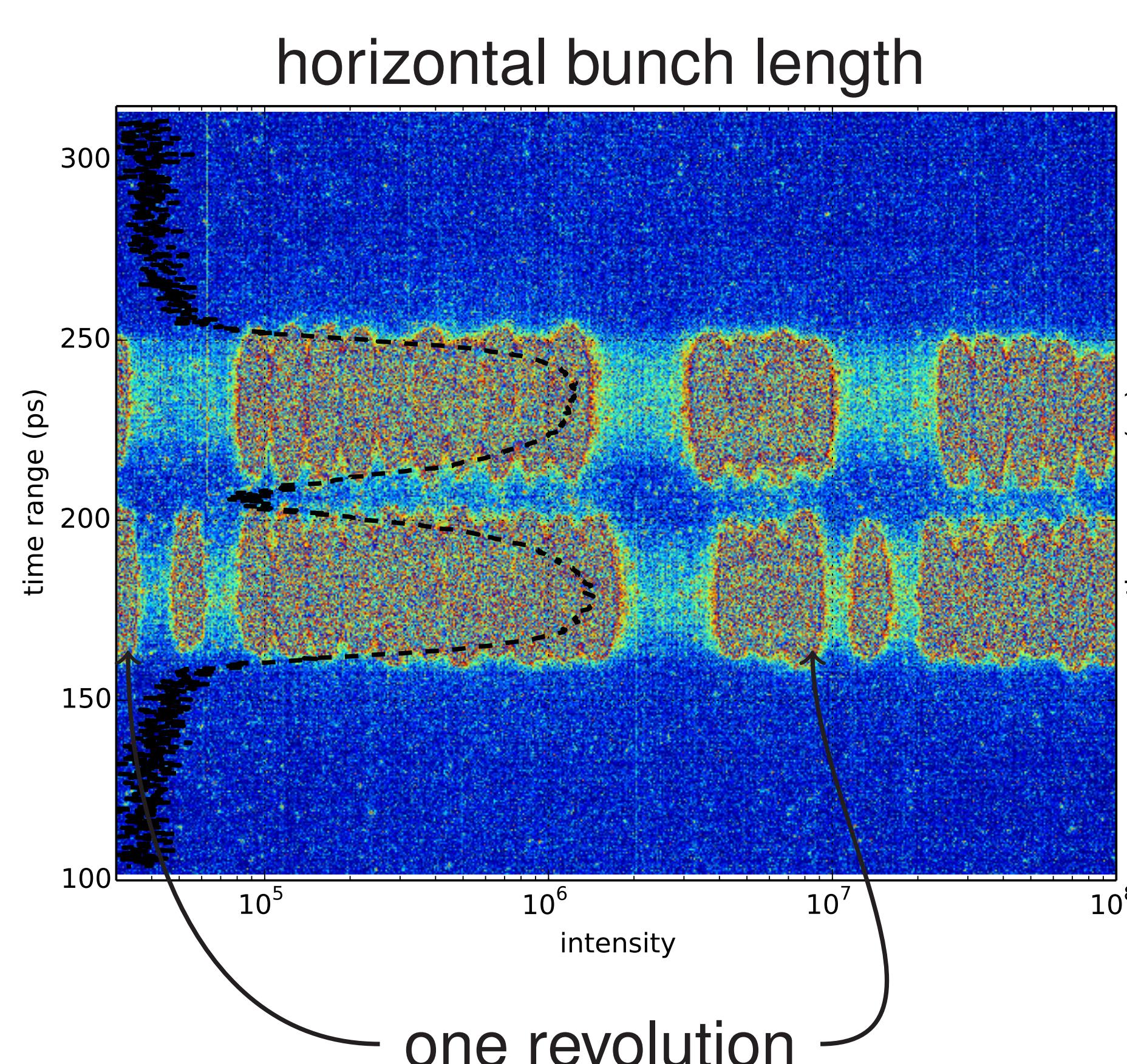


## Streak Camera Setup



The toroidal mirrors, along with a splitter and a plane mirror, on the optical table are placed on rail systems in order to provide multiple degrees of freedom to adjust for the horizontal and vertical focuses of the beam

## Measurements



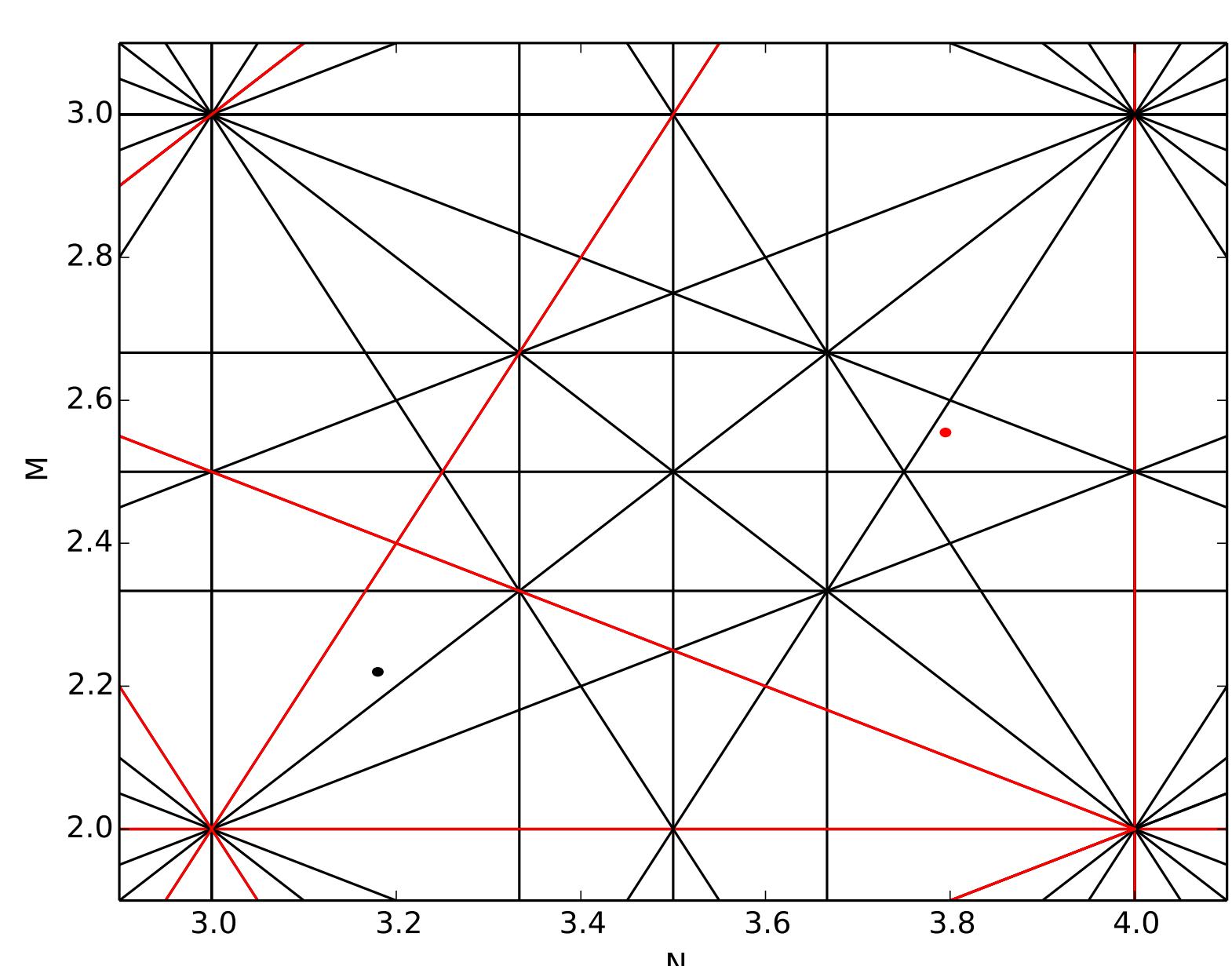
## Tune Resonance Program

### Details & Features

- developed in python
- contains GUI built with wxpython
- integrated with EPICS through the use of pyepics
- live mode that displays current non-integer working point
- given integer part, can display phase advance resonance lines and unit working point
- various customizability options available

### Pictures & Examples

Third order structural and phase advance resonance lines for the MLS



Fifth order difference resonance lines ordered by color

