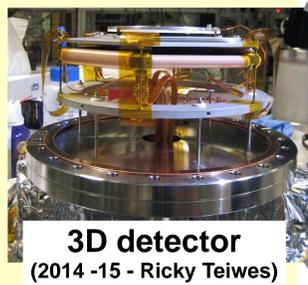


MASTER AND BACHELOR OPPORTUNITIES in the X-RING GROUP 2015-16

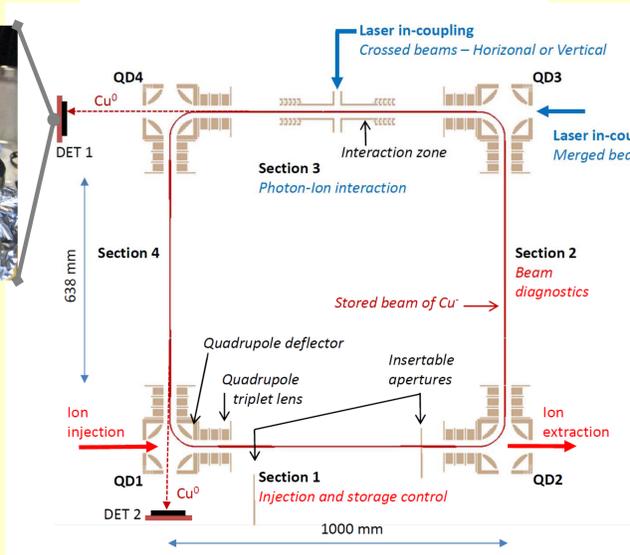
Henrik B. Pedersen
Department of Physics and Astronomy, Aarhus University



The new SAPHIRA storage ring. Physics of storage rings. 3D imaging of photofragmentation processes.



Schematic layout of SAPHIRA



Examples of specific projects 2015-16

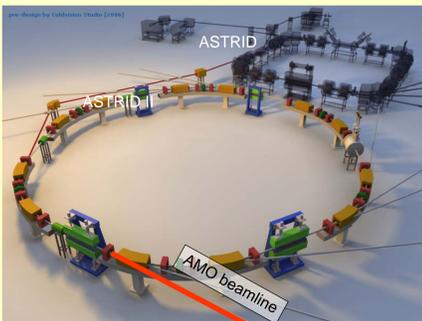
Physics of storage rings

- Investigation of new stability regions of SAPHIRA
- Manipulation of stored ions with applied fields
- Measurement of betatron tunes for SAPHIRA

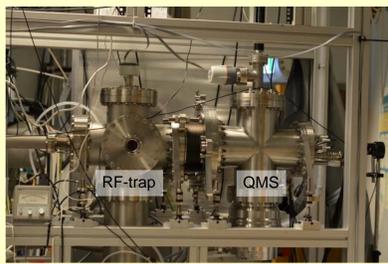
3D photofragmentation imaging

- $\text{Cu}_2^- + h\nu \rightarrow \text{Cu}^0 + \text{Cu}^-$
 - investigation of a surprising claim made at AU
- $\text{H}_2^- + h\nu \rightarrow \text{H}^0 + \text{H}^0 + e^-$
 $\rightarrow \text{H}^0 + \text{H}^-$
 - unraveling the stability of the simplest molecular anion

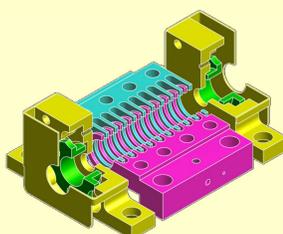
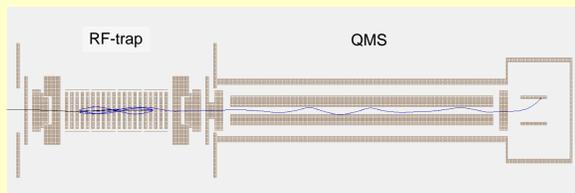
The X-RING laboratory. Chemical reactions in the gas phase. Isolated ions under XUV-irradiation.



XUV light to the X-RING laboratory



Radio-frequency ion trap and Quadrupole Mass Spectrometer in the X-RING lab



Examples of specific projects 2015-16

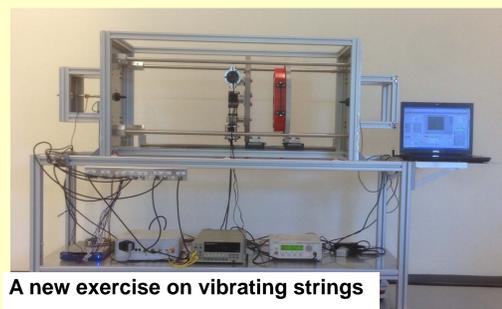
Chemical reactions

- $\text{O}^- + \text{C}_2\text{H}_4 \rightarrow \text{C}_2\text{H}_2^- + \text{H}_2\text{O} / \text{C}_2\text{H}_2\text{O}^- + \text{H}_2$
 - how are exotic anions produced ?
- $\text{O}^- / \text{O}_2^- / \text{O}_3^- + \text{SO}_2 \rightarrow ?$
 - what are the fundamental mechanisms for forming aerosols in the atmosphere ?

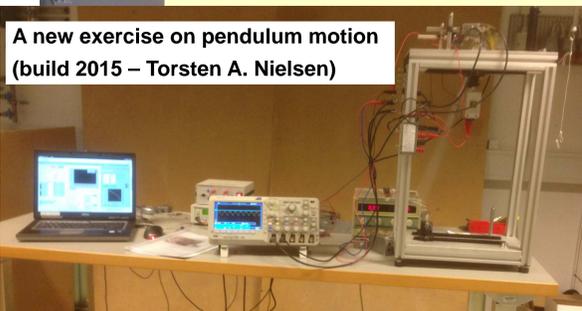
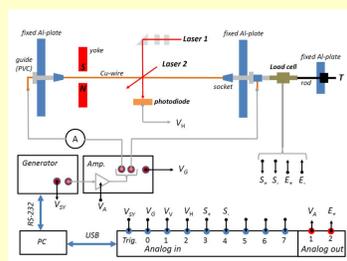
Isolated ions under XUV-irradiation

- (Not fully available in 2015-16)
- first experiments with a new photoelectron spectrometer
 - several developmentally oriented projects available

Development of new laboratory exercises in mechanics



A new exercise on vibrating strings (build 2014 – Jeppe L. Knudsen)



A new exercise on pendulum motion (build 2015 – Torsten A. Nielsen)

Examples of specific projects 2015-16

A new exercise on collisions

- can we make a simple setup where exchange of energy, momentum, and angular momentum in 2D-collisions can be illustrated ?

Chaotic motion of a vibrating string

- use a newly build setup to investigate and characterize dynamical regimes of a vibrating string

Doubouchinski-pendulum

- use the newly build pendulum setup to illustrate and characterize a special pendulum