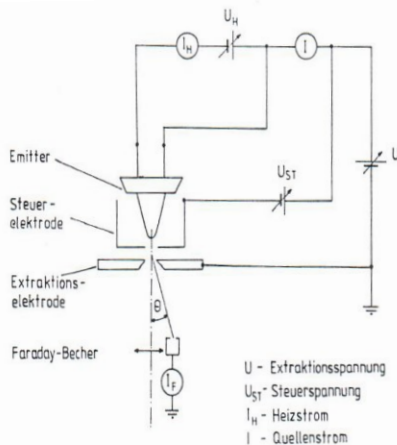


# Bachelor or Master Thesis: Liquid metal ion source for strong field laser experiments

In the group Nonlinear Optics at the IOQ we perform experiments to investigate the ionization dynamics of atomic and molecular ions in ultrashort laser pulses. The use of ions gives access to fundamental systems of laser-matter interaction and allows the observation of fundamental quantum mechanical processes on the femto- and attosecond time scale.

The **aim** of this thesis is the commissioning of a novel type of ion source. Field ionization sources based on liquid metal allow the production of ion beams with an extremely high brightness of up to  $10^6 \text{ A cm}^{-2} \text{ sr}^{-1}$ . Due to its special properties, this source type is for example used as an ion beam engine in space. In strong field laser experiments with ion beam targets this source will dramatically increase the statistics and give access to a large range of new experiments.

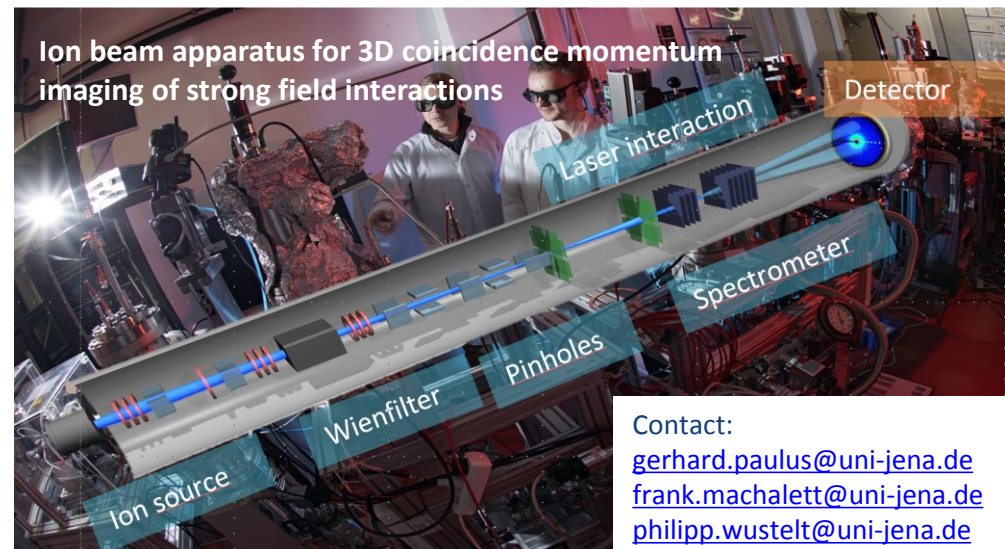
## Experimental Setup



Liquid metal allow ion source

## Objectives:

- Assembling of a liquid metal ion source
- Characterization of the emission properties
- Simulation and optimization of ion optics (e.g. with Simion)
- Strong field laser experiments with ion beams



## Literature:

- Machalett et al., *Rev. Sci. Instrum.* **69**, 1336 (1998)  
Wustelt et al., *Phys. Rev. Lett.* **121**, 073203 (2018)

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