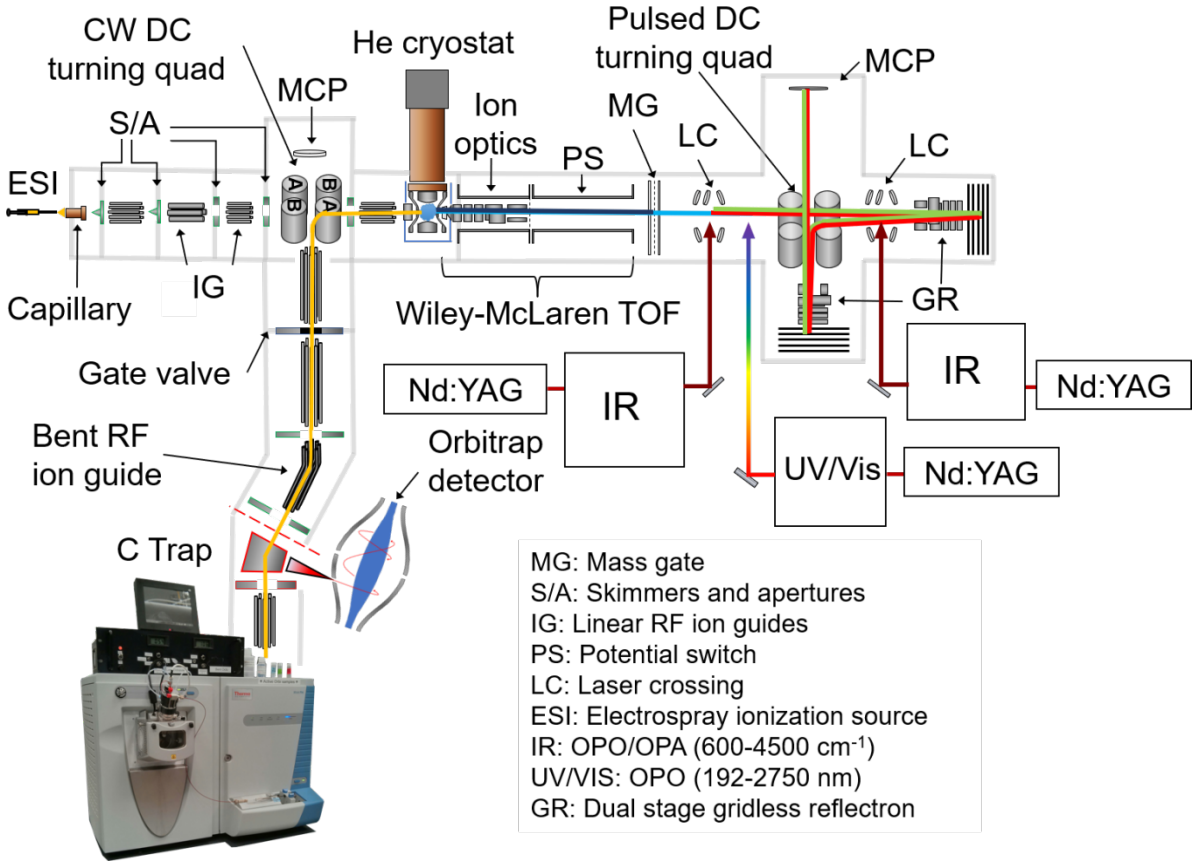
Project Goals

Build and commission a **hybrid mass spectrometry/optical spectroscopy instrument** for chemical analysis. This is to be housed in the Chemistry and Biology Instrument Center and managed by a staff member (Dr. Fabian Menges) for **general use by the chemical and biological sciences** at Yale.
The instrument uses class IV lasers and can therefore not be operated as a walk-up instrument (safety concerns and experience needed).

*The **instrument and the control software** need to be designed so that a **minimum amount of operator time** is needed, otherwise it won't be used!*



https://link.springer.com/article/10.1007/s13361-019-02238-y

Resources Needed

Machine Shop & Student Machine Shop
ITS software library (licenses for e.g. Autodesk Inventor)
Facilities
Budget tracking
Programming Classes
Electronics Shop and Engineers
Mechanical Engineers for optimization of design

PI/Group

Mark Johnson

Current use of Cores, needed personal development (amplified by training resources) and potential advances through an 'Advanced Instrumentation Development Center'

Mechanical Parts:

- Autodesk Inventor student license through ITS software library - software training
- Revision of design by engineer
- Student workshop for basic metal manufacturing techniques
- Machine shop for manufacturing of parts
- vacuum grade welding in the machine shop
- integrated workflow from CAD design to CNC machine manufacturing

Control Electronics:

- electronics specialists in the fields of:
  - microcontrollers
  - instrument communication & interface design
  - circuit design for DC power supplies, remote control of these and TTL triggering
  - Radio Frequency applications
- cryo engineer for optimization of the existing design with respect to heat transfer, would also be great for having a look at the CBIC Helium recovery system, cryo EM facilities, our lab and likely for several others
- engineer in material flow simulation who could help optimize He buffer gas cooling, optimizing vacuum envelopes with respect to leak rates, pumping efficiency etc.

Control Software:

- ITS software library - software training classes
- Software engineer to discuss the scope of the project and guidance on program design - programming as part of the instrument development
- Outsourcing of tasks that are too complex for a beginner/intermediate in programming