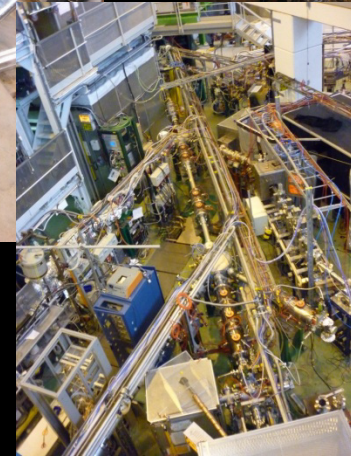


# ISOLDE IsolTrap



Praktikum vom 09.05.11 bis 20.05.11

Betreuerin: Dr. Susanne Kreim

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## Mein Arbeitsplatz

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## Mein Praktikum

- An IsolTrap
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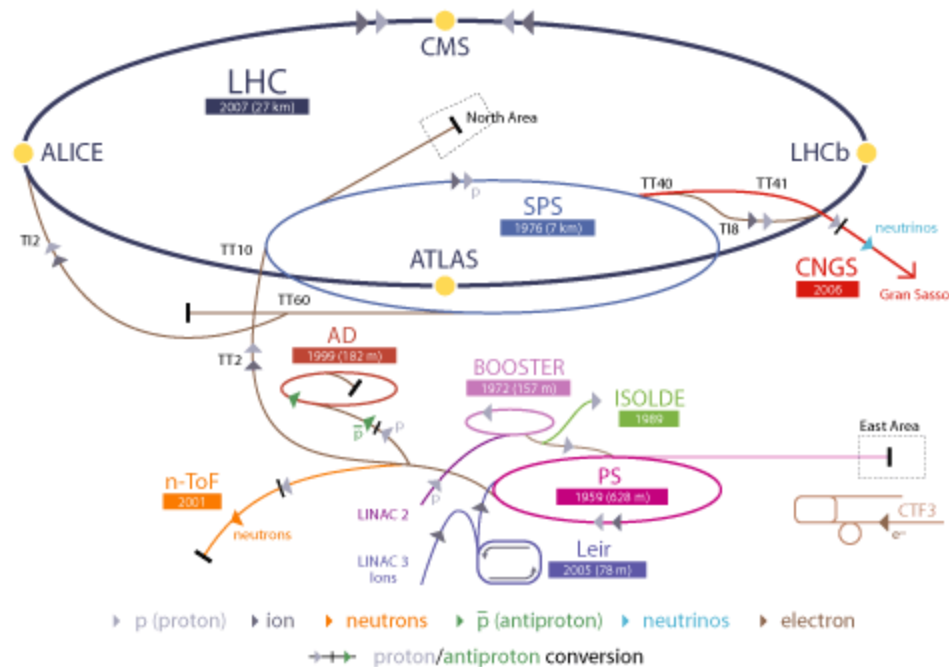
## Fazit

# Isolde

## Mein Arbeitsplatz



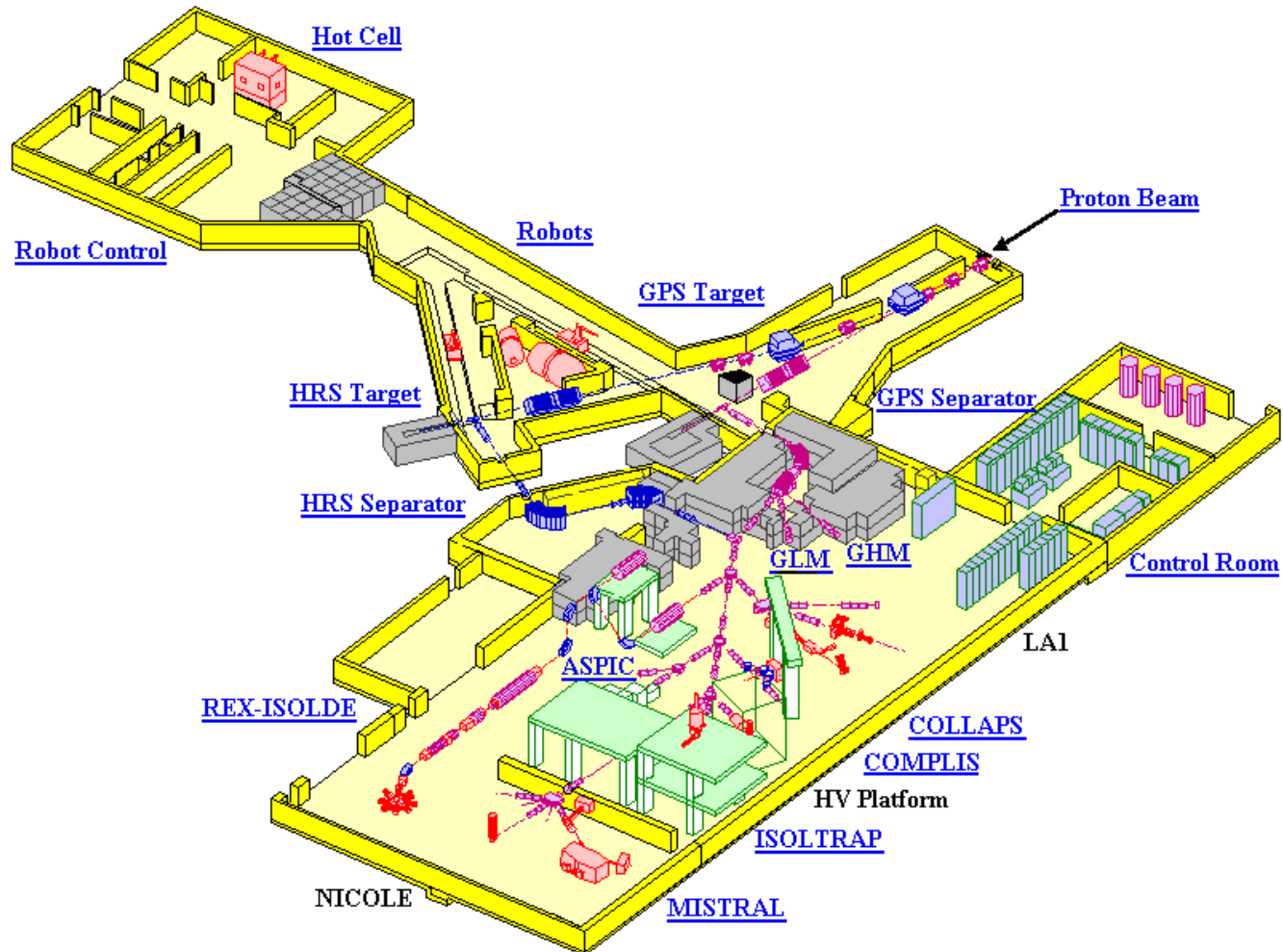
### CERN Accelerator Complex



- LHC Large Hadron Collider   SPS Super Proton Synchrotron   PS Proton Synchrotron
- AD Antiproton Decelerator   CTF3 Clic Test Facility
- CNGS Cern Neutrinos to Gran Sasso   ISOLDE Isotope Separator OnLine DEvice
- LEIR Low Energy Ion Ring   LINAC Linear ACcelerator   n-ToF Neutrons Time Of Flight

# Isolde

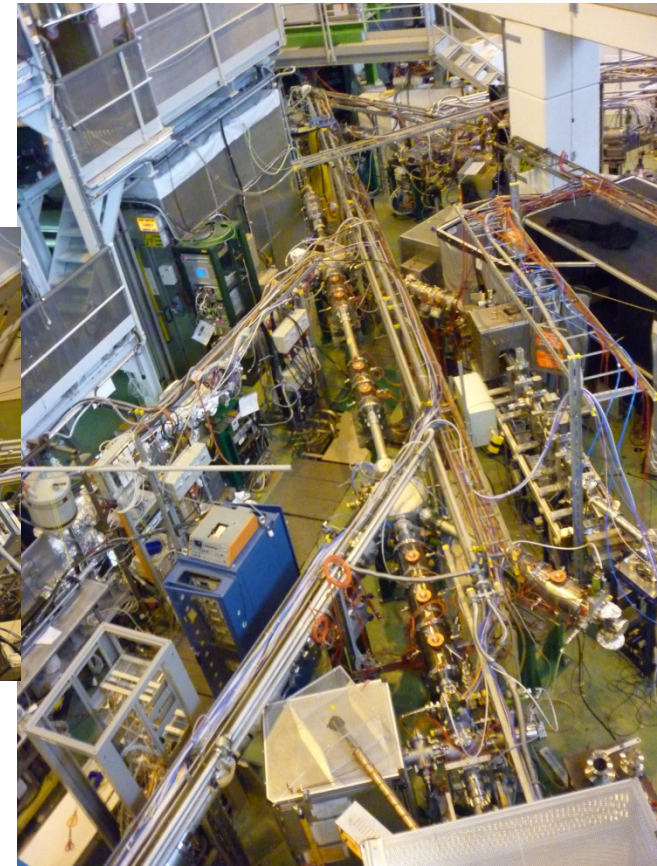
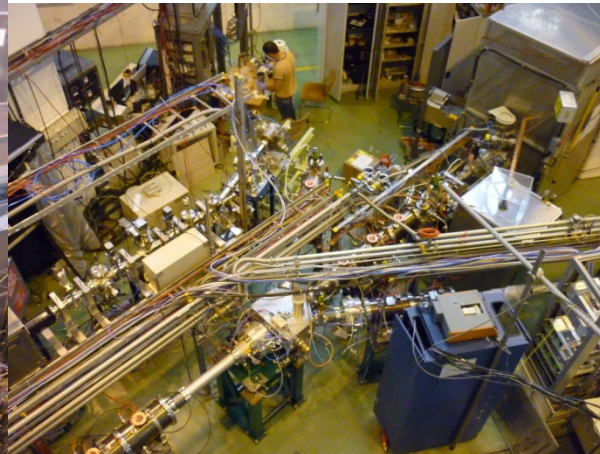
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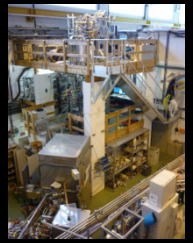




# Isolde

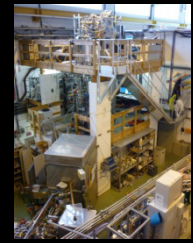
Mein Arbeitsplatz



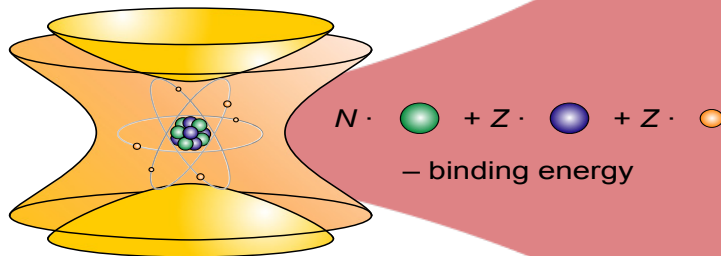


## Was macht Isoltrap?

Präzisionsmassenmessungen an  
kurzlebigen Kernen



## Warum Massen messen?

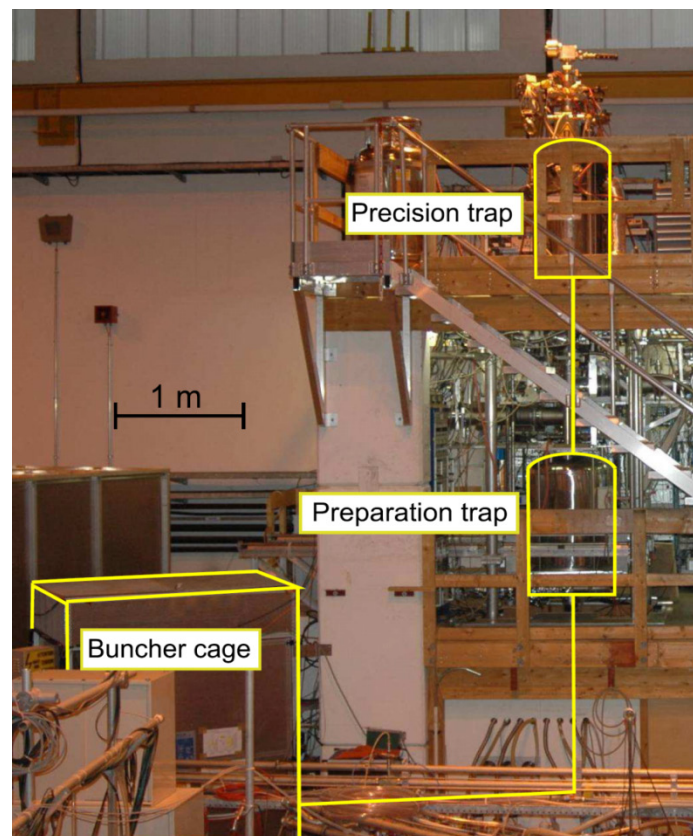


	$\delta m/m$
General physics & chemistry	$\leq 10^{-5}$
Nuclear structure physics - separation of isobars	$\leq 10^{-6}$
Astrophysics - separation of isomers	$\leq 10^{-7}$
Weak interaction studies	$\leq 10^{-8}$
Metrology - fundamental constants	$\leq 10^{-9}$
CPT tests	$\leq 10^{-10}$
QED in highly-charged ions - separation of atomic states	$\leq 10^{-11}$

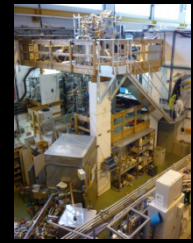




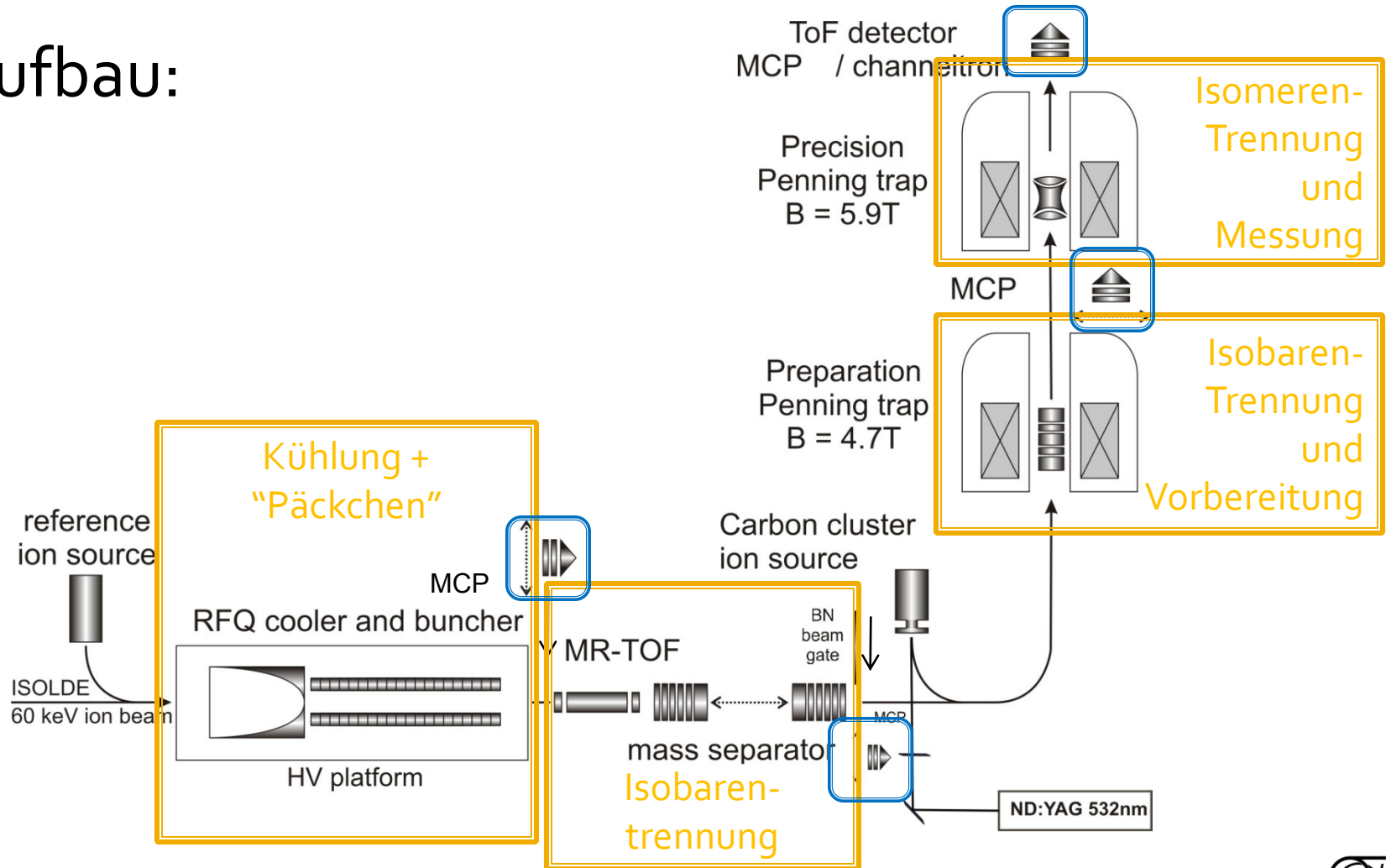
## Aufbau:

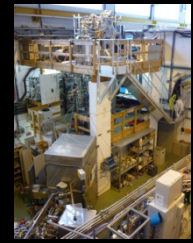




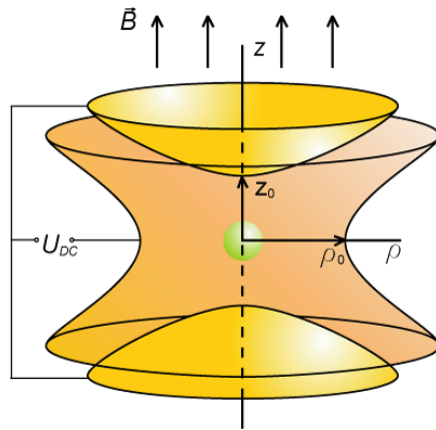


### Aufbau:

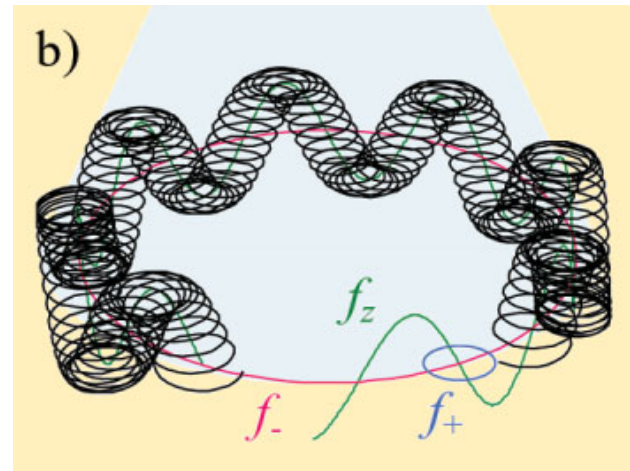




## Die Messung:



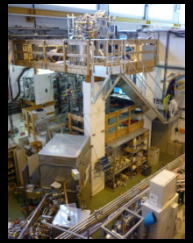
Penningfalle



$$f_c = f_+ + f_-$$

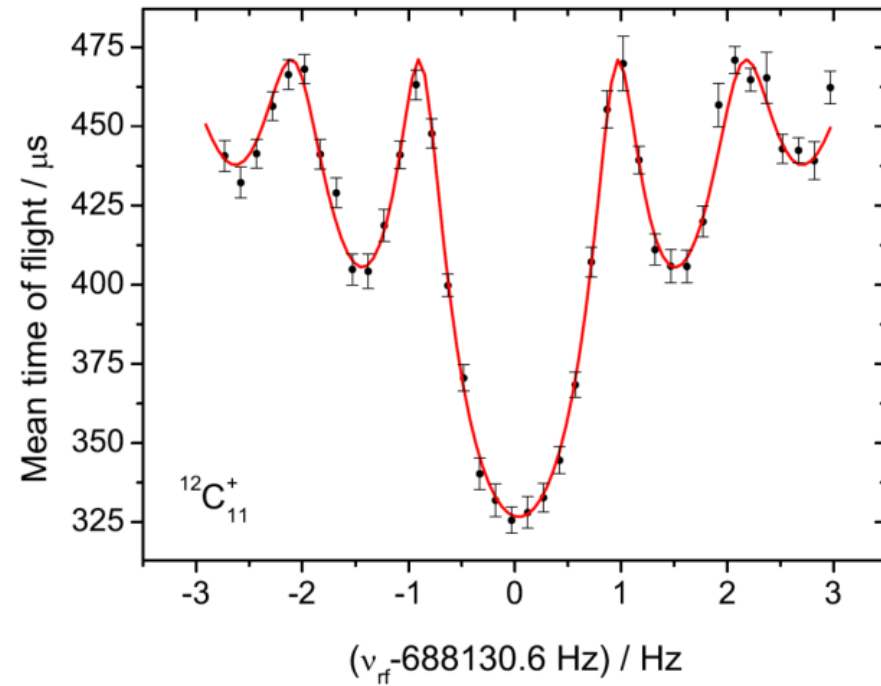
massenabhängig  
Quadropolanregung

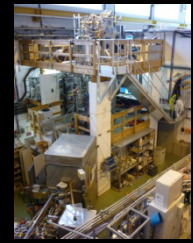
massenunabhängig  
Dipolanregung



## Die Messung:

$$v_c = \frac{1}{2\pi} \cdot \frac{q}{m} B.$$



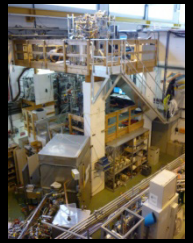


### Am Computer:

The screenshot displays the IsolTrap control software interface. It features several windows for different beamline sections (HV\_BSeg01 to HV\_BSeg26) and a central HV\_Lens window. Each window shows properties such as index, channelName, nominal voltage, and actual voltage/current. A status bar at the bottom indicates 'Can't execute function'.

The screenshot displays the IsolTrap data acquisition and analysis software. It shows multiple plots of detector signals versus time and channel number. The plots include 'Ent Free vs Time', 'Ents vs Scan', 'Ents vs Time', 'Ents vs Scan', and 'Ents vs TOF'. The software is running on a Windows operating system.





- Messung bei Kernen bis Halbwertszeit  
 $t = 60\text{ms}$
- Dauer Messzyklus:
  - normal:  $\sim 900\text{ms}$
  - kürzeste:  $\sim 600\text{ms}$
- Effizienz:  $\sim 1\%$ 
  - Produktionsrate:  $10^3 \frac{\text{ions}}{\text{s}}$

# Praktisches

## Mein Praktikum



## Schrauben sortieren



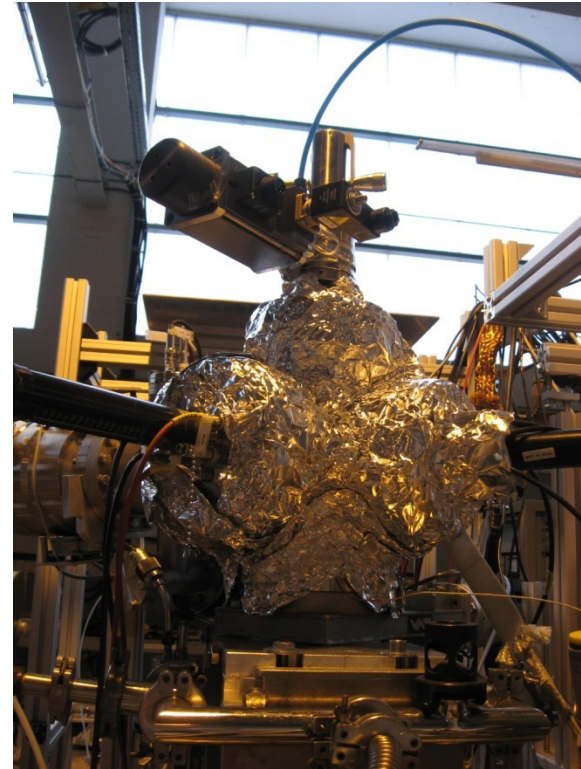
Konstruktions-  
zeichnung

Konstruktion einer Haltevorrichtung für eine Pumpe



# Praktisches

## Mein Praktikum



## Ausheizen



# Praktisches

Mein Praktikum



Ausheizen

# Praktisches

## Mein Praktikum

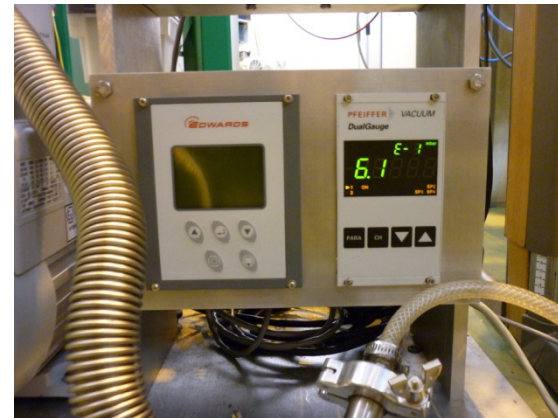
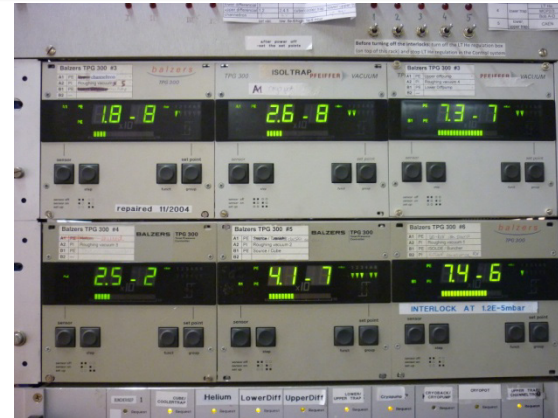


## Exsikkator-Pflege



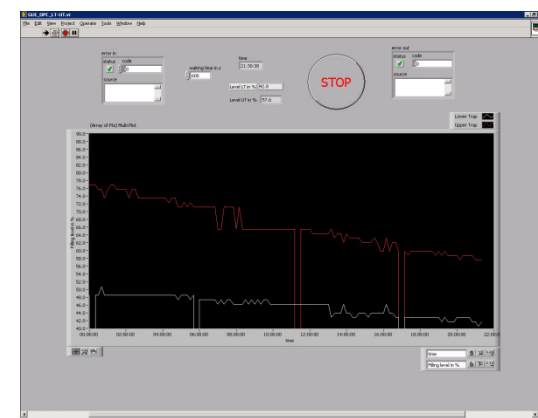
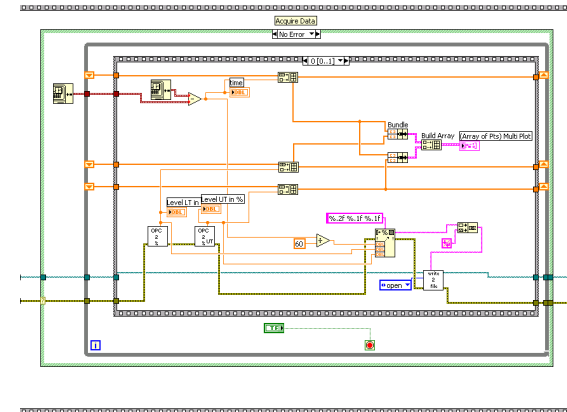
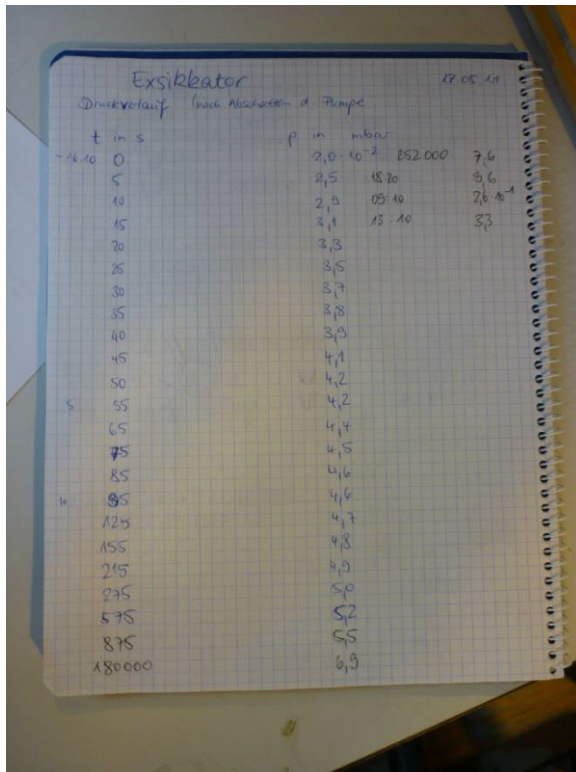
# Praktisches

## Mein Praktikum



## Druckverlaufmessung

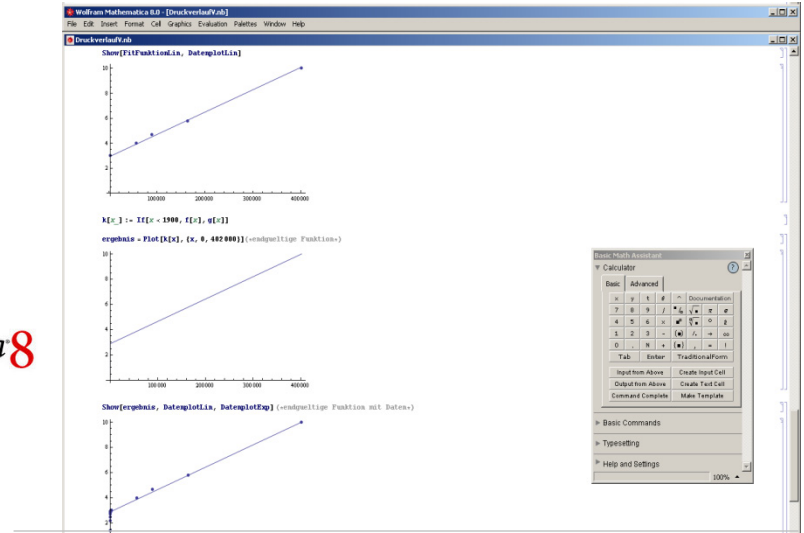
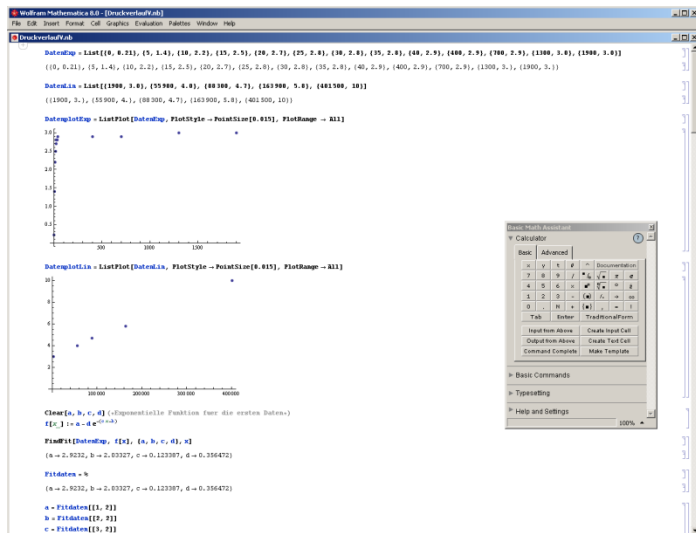
# Computer Mein Praktikum



## Druckverlaufmessung



# Computer Mein Praktikum

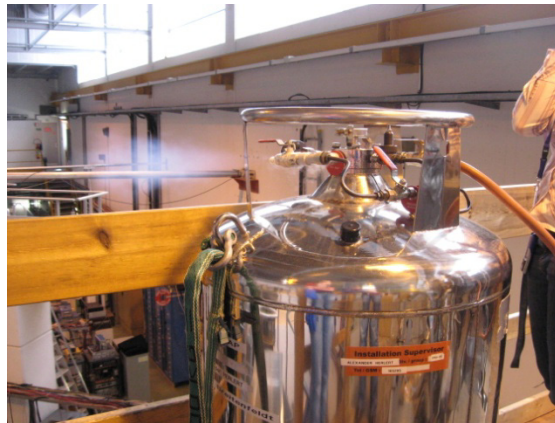


## Mathematica



# Computer Mein Praktikum

- Bestellungen
- Kernphysik Vorträge  
bei Richard Casten (Yale University)
- Experimente



Sonstiges

# Das Team

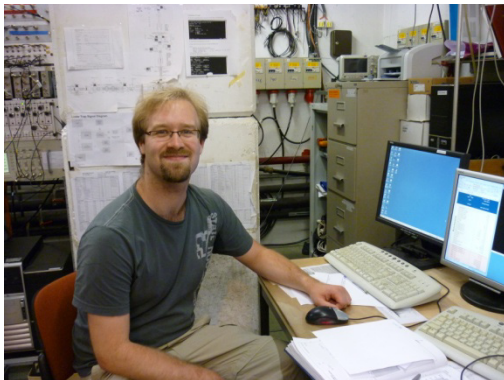
Mein Arbeitsplatz



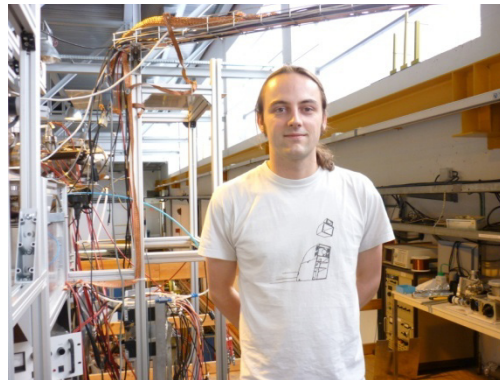
Susanne



Marco



Christopher



Robert



Jonathan und Vladimir

# Danke!

- **Susanne**  
für all die Zeit, Geduld und Mühe (und all die tollen Zeichnungen)
- **Marco, Christopher und Robert**  
für geduldige Erklärungen in allen möglichen Bereichen
- **Jonathan und Vladimir**  
für die gemeinsame Arbeitszeit und diverse interessante Unterhaltungen
- **Rick Casten**  
für die sehr verständlichen und geduldigen Erklärungen der Kernphysik
- **dem gesamten ISOLDE-Team**  
für die freundliche "Aufnahme"