

ISOLDE

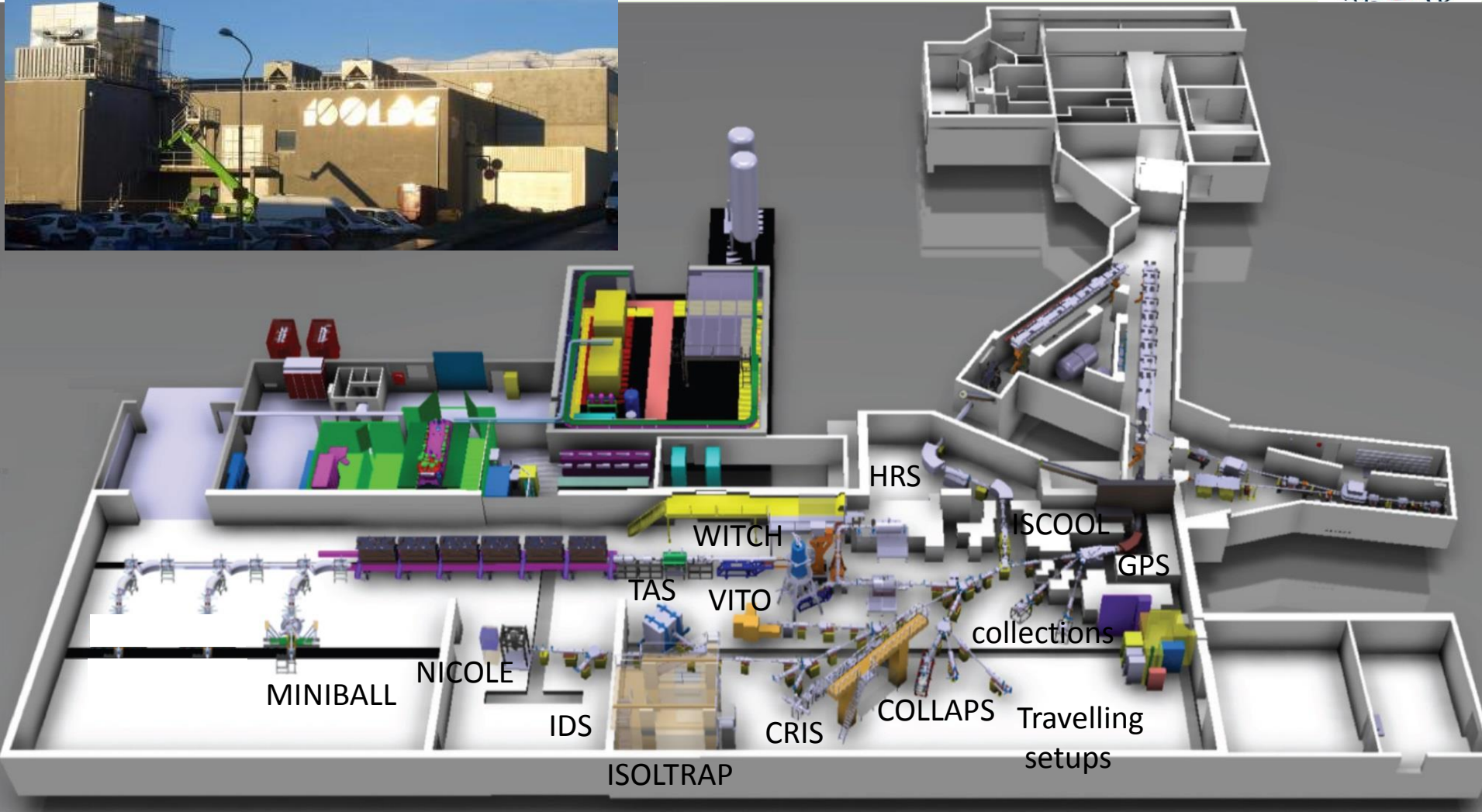
Emily Ghosh

ISOLDE

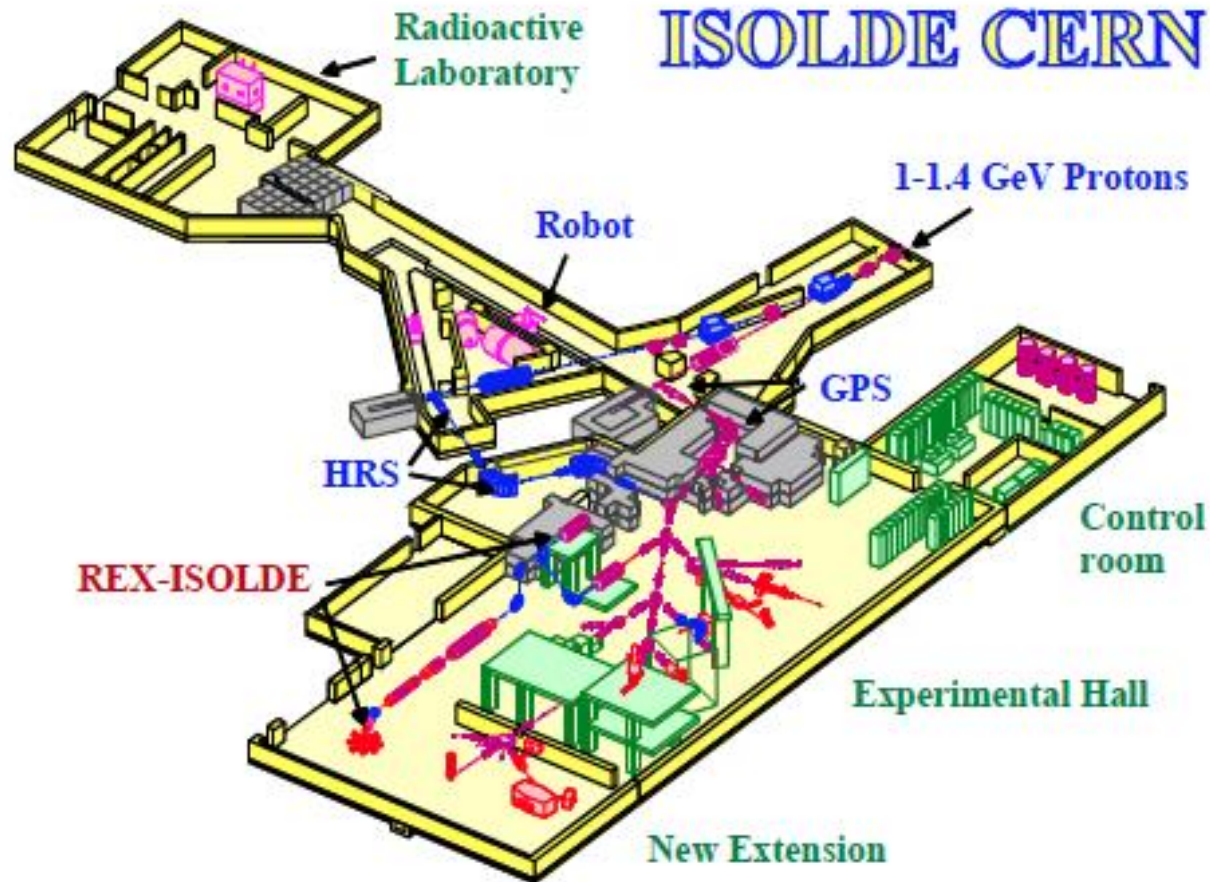


- Isotope mass Separator On-Line DEtector
- Located at Proton Synchrotron Booster (PSB) at CERN
- Use of radioactive nuclei beams for experiments in
 - Nuclear and Atomic Physics
 - Solid State
 - Material Science
 - Life Science

The ISOLDE facility



The ISOLDE facility



Emission Mössbauer spectroscopy

Implanted probes:



Major benefits:

$\Delta E (\gamma) \sim \text{neV}$

→ Hyperfine interactions

Measure dilute ($\sim 10^{-4}$ at.%)

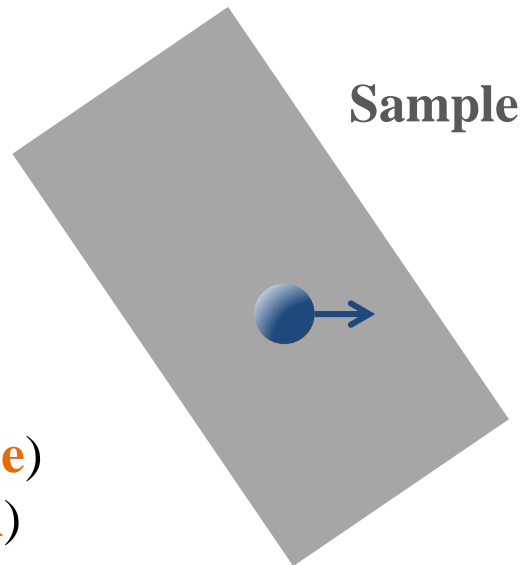
Chemistry of Mn/In

Recoil

$\langle E_R \rangle \sim 40 \text{ eV}$ (${}^{57}\text{Mn} \rightarrow {}^{57}\text{MFe}$)

$\langle E_R \rangle \sim 8 \text{ eV}$ (${}^{119}\text{In} \rightarrow {}^{119}\text{MSn}$)

→ Interstitial defects



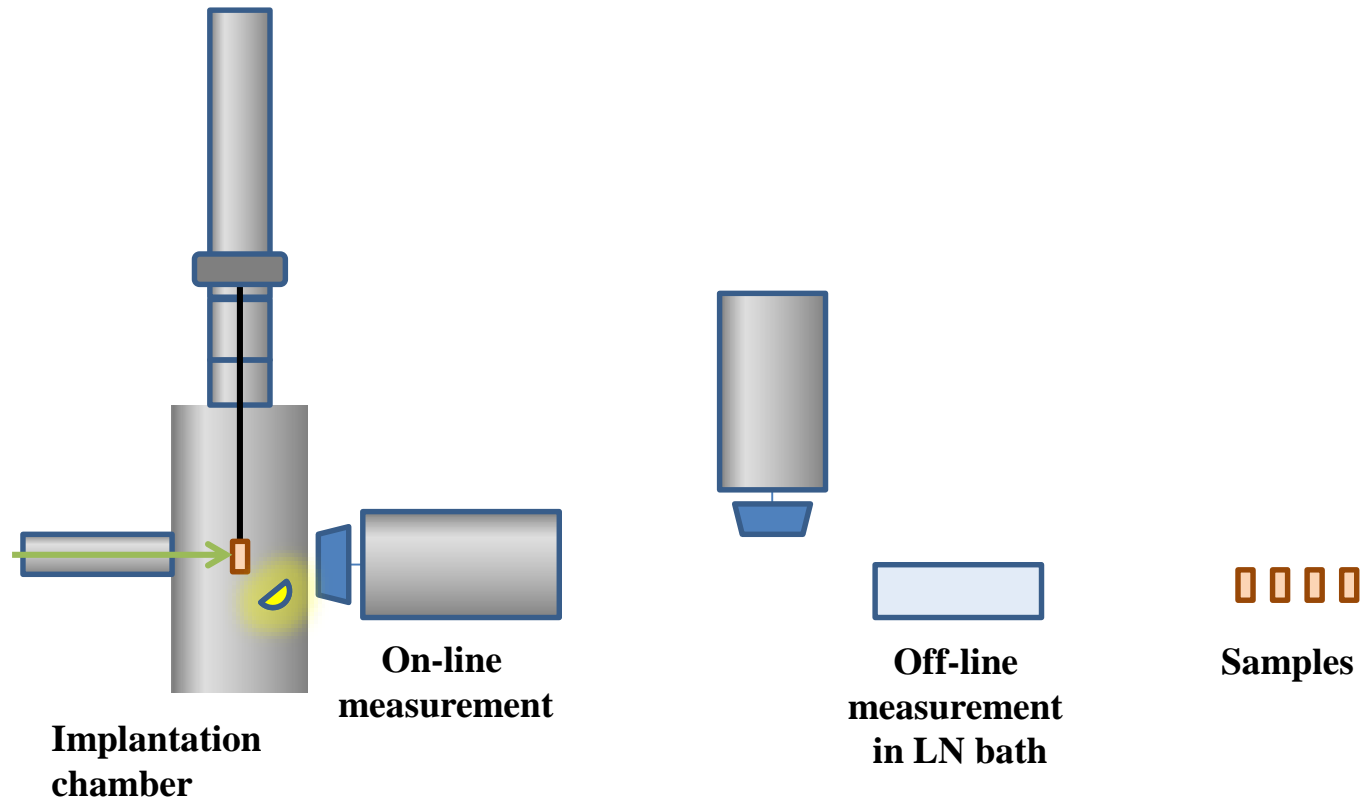
Emission Mössbauer spectroscopy



- Implanting isotopes to see effects on surrounding material
 - Gamma radiation to sample
 - Emission from the sample is probed using sample as reference

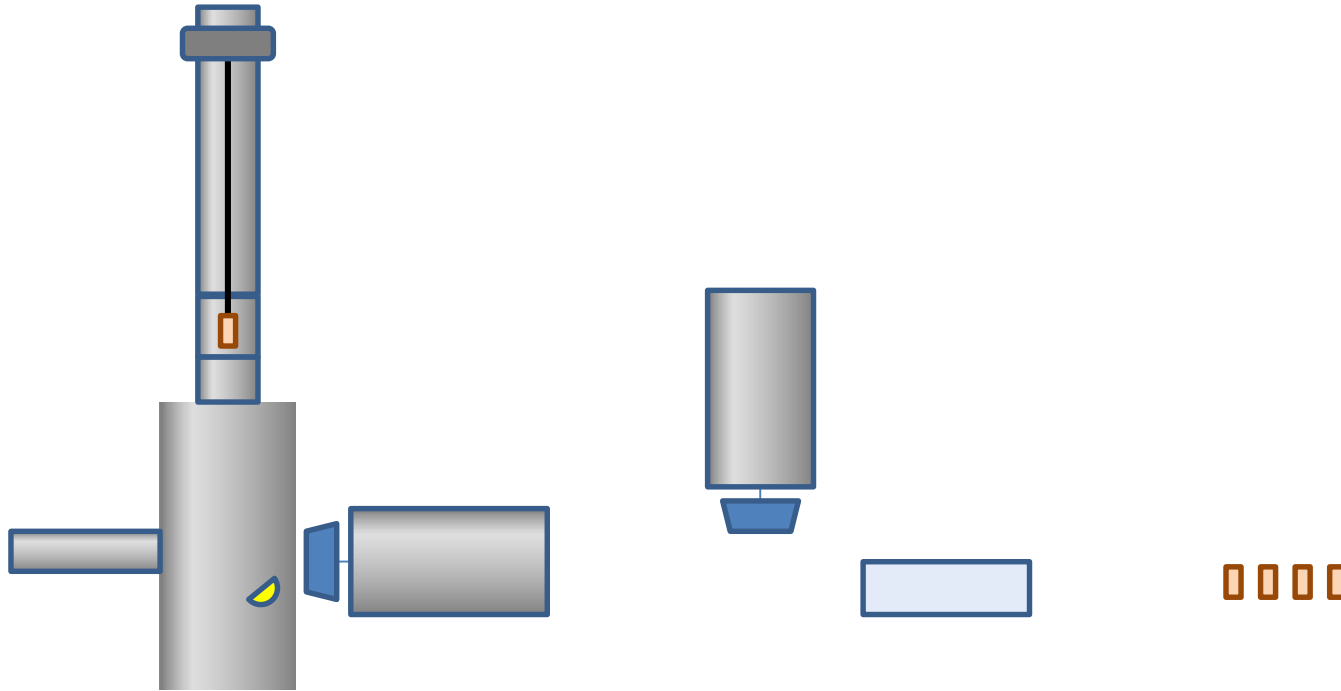
Quenching experiments

1. Implant (and measure) at elevated temperatures (RT-1000 K)
2. Remove the sample from vacuum, quench in liquid nitrogen, measure off-line



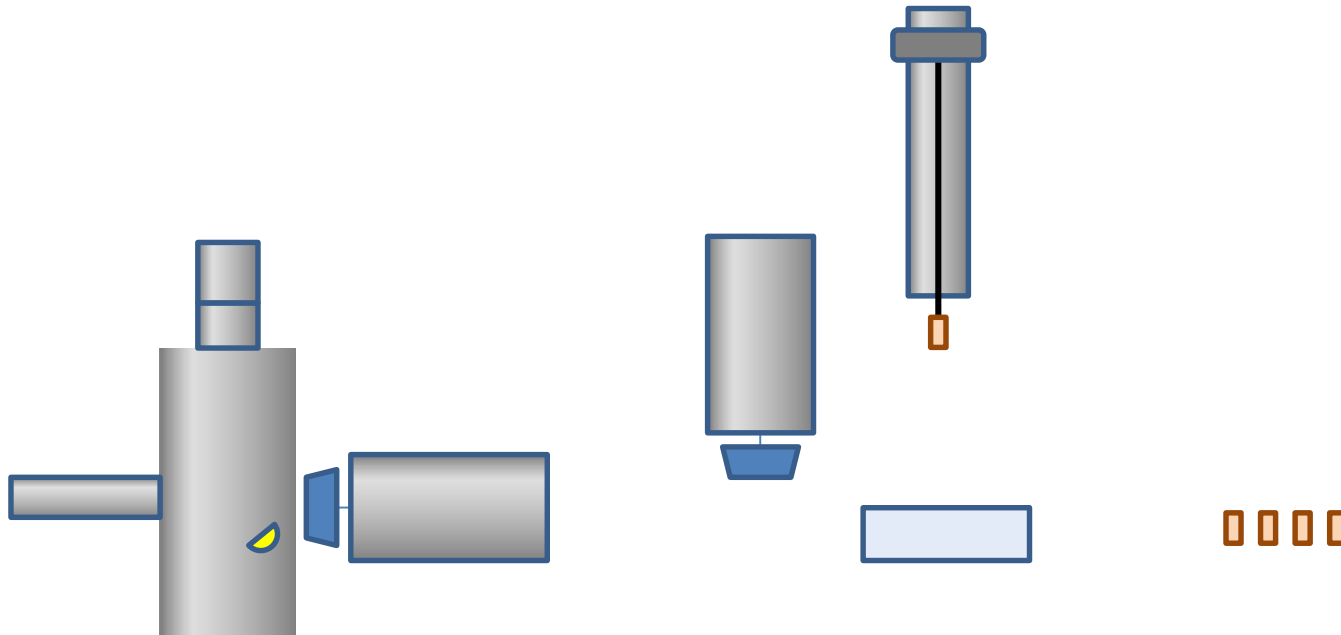
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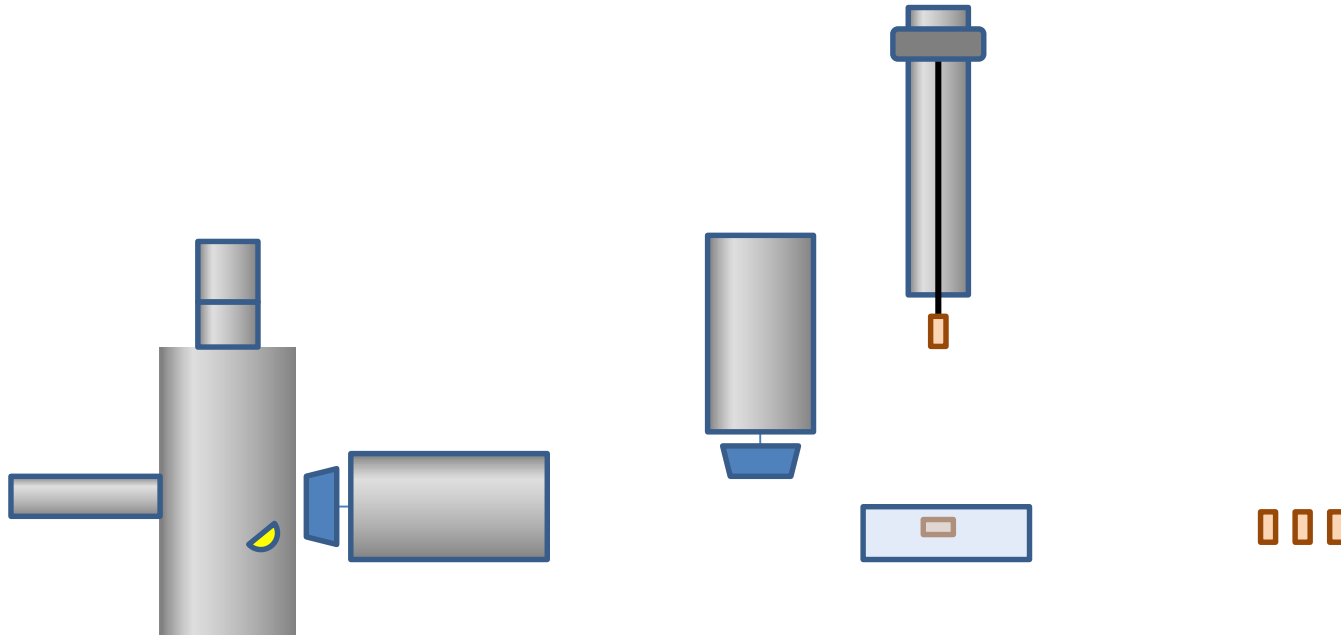
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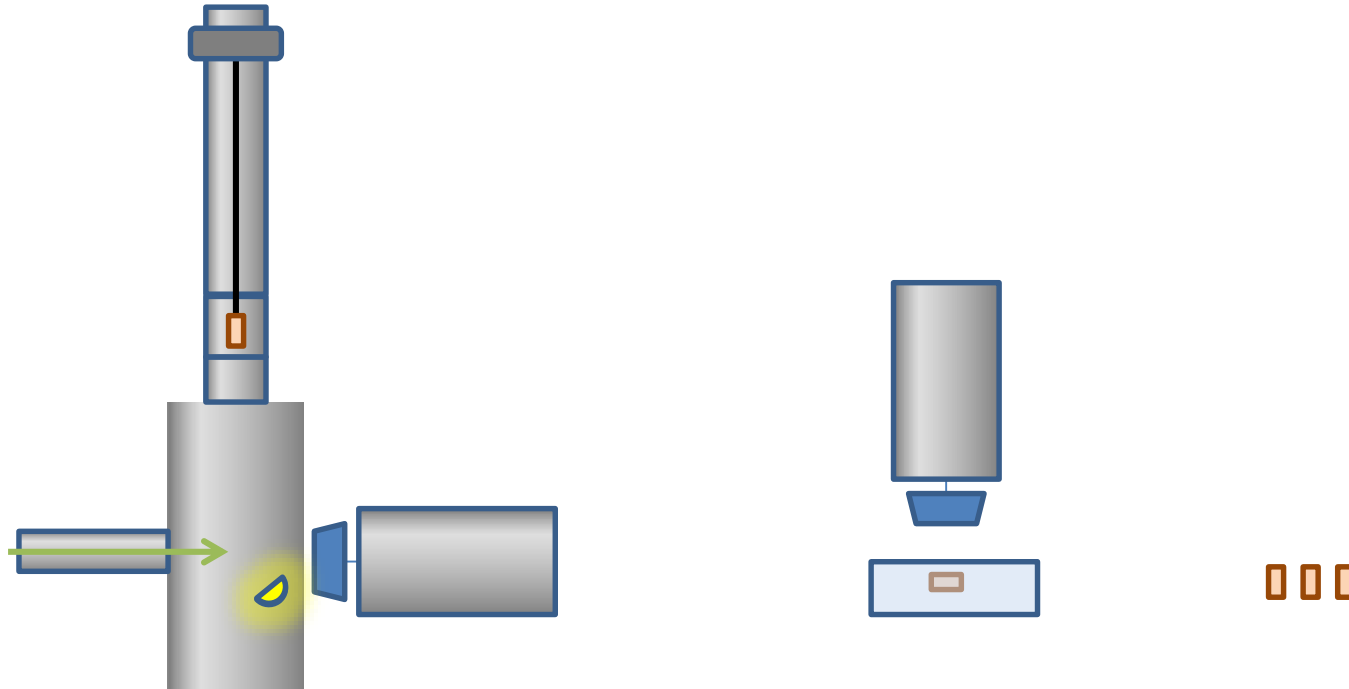
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- Implanting ^{57}Mn and ^{119}In into silicon nitrides
 - Damage or magnetic properties?

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