

Line for Laser-Induced Nuclear Orientation

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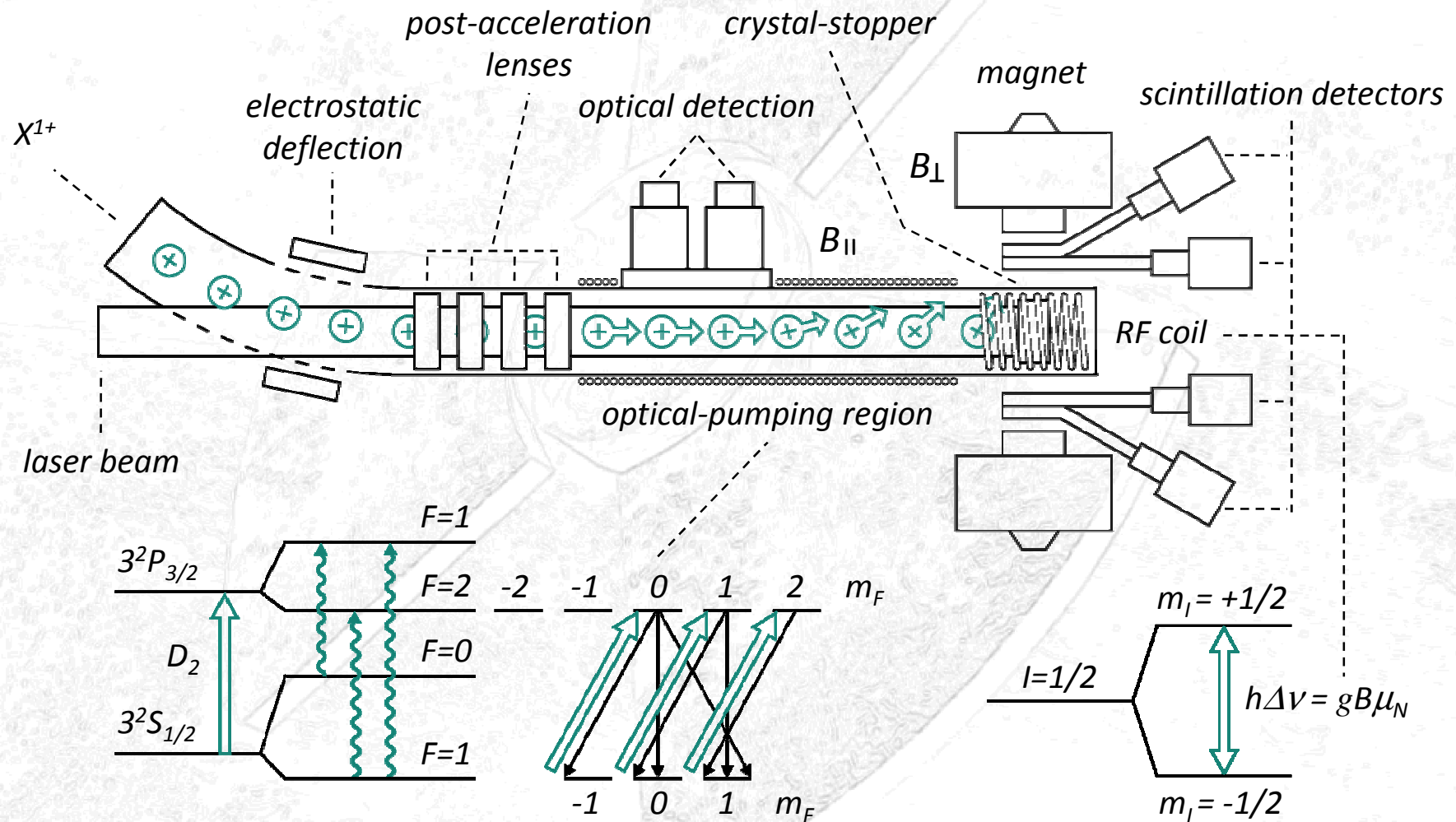
Potential research fields:

- *β - asymmetry detection of HFS and NMR => $I, \mu, Q, \langle r^2 \rangle^{1/2}$*
- *β - delayed spectroscopy => excited-state spins*
 - *Fundamental research via the β decay*
 - *Material studies via the chemical shifts, etc.*

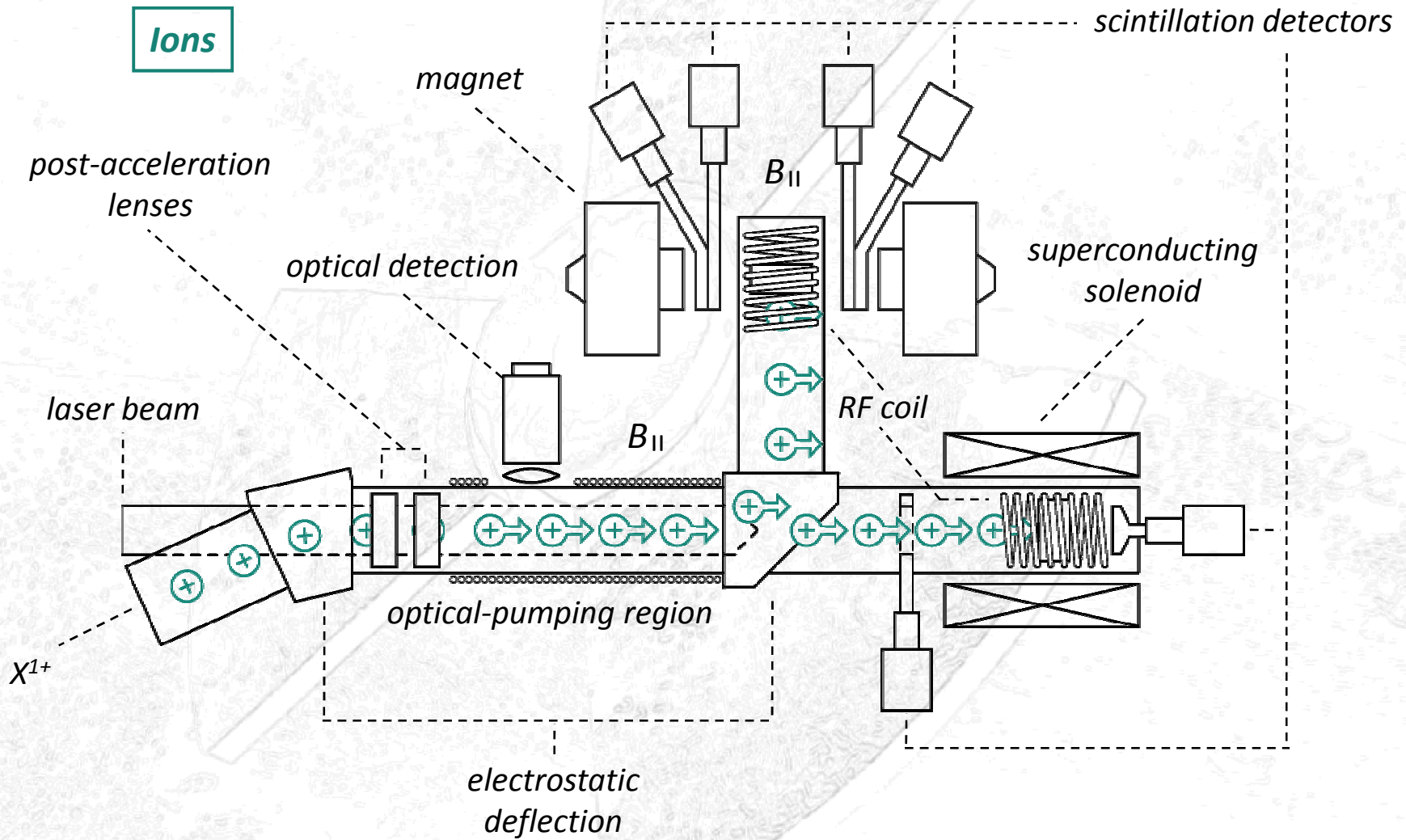
Outline

- *Laser-induced nuclear orientation: COLLAPS@ISOLDE / ISAC@TIUMF*
- *Considerations: space, power and other local resources*
- *Location*
- *Requirements - summary*

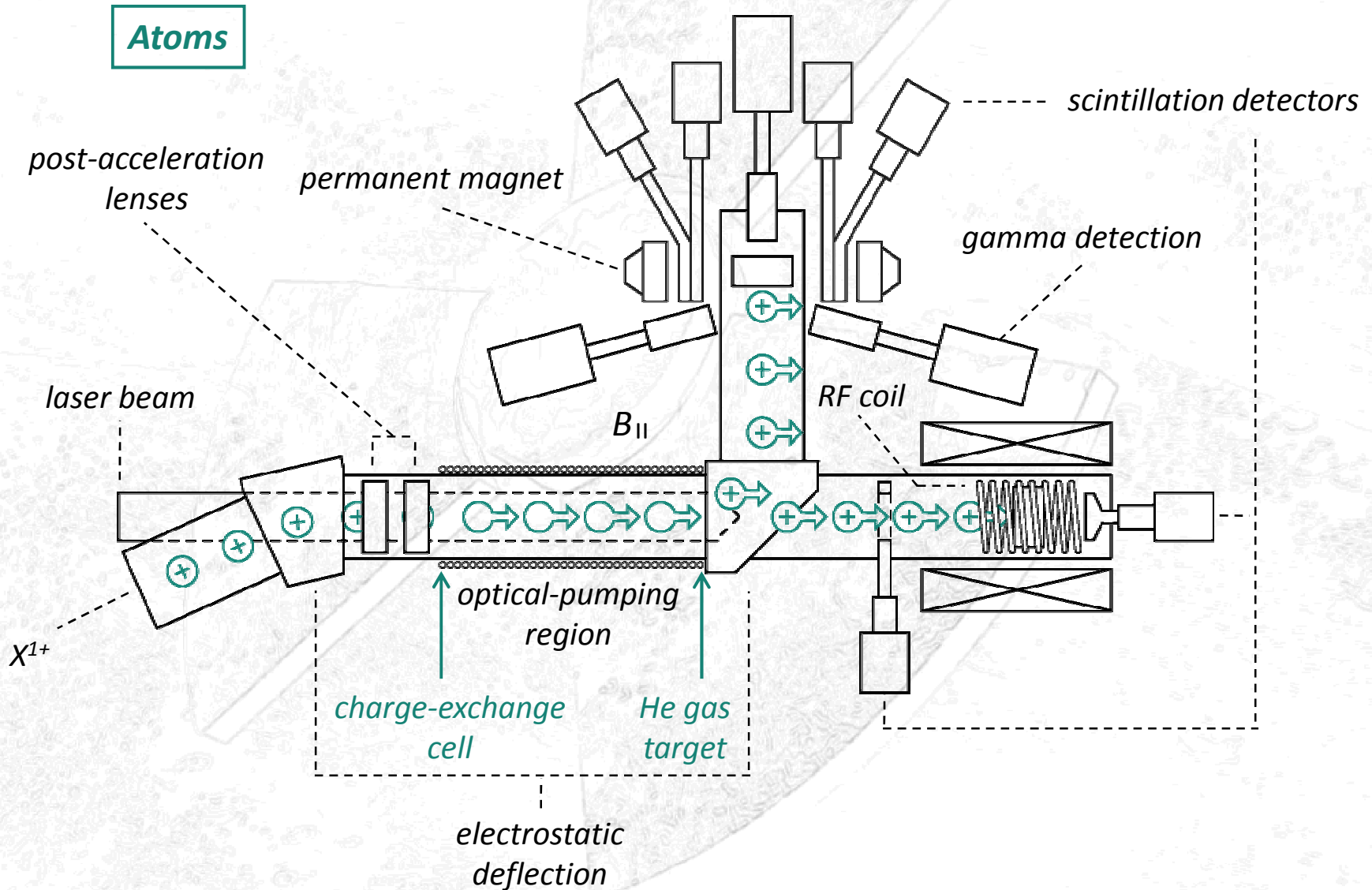
Example: Collinear Laser Spectroscopy Setup @ ISOLDE - CERN
(adiabatic spin rotation)



Example: Facility @ ISAC - TRIUMF
(no spin rotation)



Example: Facility @ ISAC - TRIUMF
(no spin rotation)



Upper limit on magnet requirements, example: Bruker B - E25v

Technical specifications

Magnet

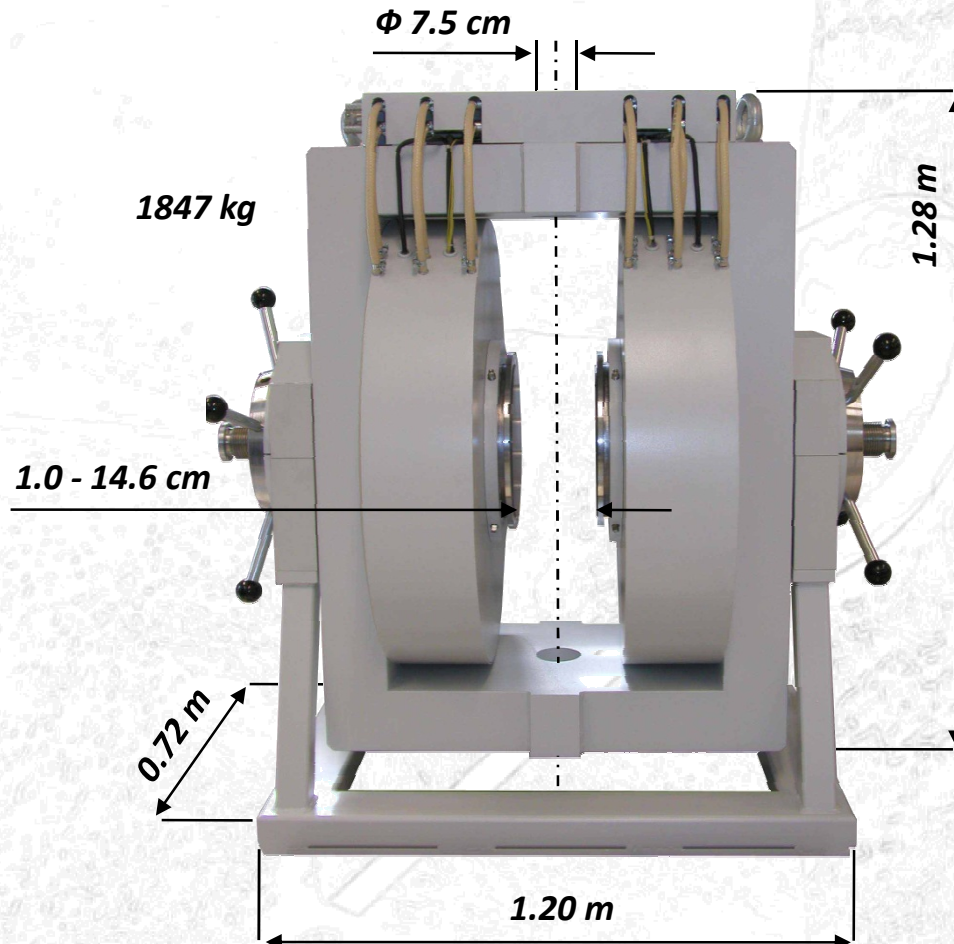
- weight: 1847 kg
- length: 720 mm
- width: 1200 mm
- height: 1280 mm
- water cooling: 35 l/min, $\Delta p_{max} = 5$ bar
- pole gap: 10 - 146 mm
- max. field at 125 mm: 0.9 T
- homogeneity over 1 cm²: $\Delta B/B = 10^{-5}$

Power supply

- input: three phase, 400 V, no neutral
- maximum output: 60 A / 200 V / 12 kW
- dimensions: 600 × 600 × 1345 mm
- weight: 200 kg
- water cooling: 2 l/min, $\Delta p = 1.5 - 10$ bar
- maximum ambient temperature: 30 °C

Required:

- Space
- Crane
- Easy access



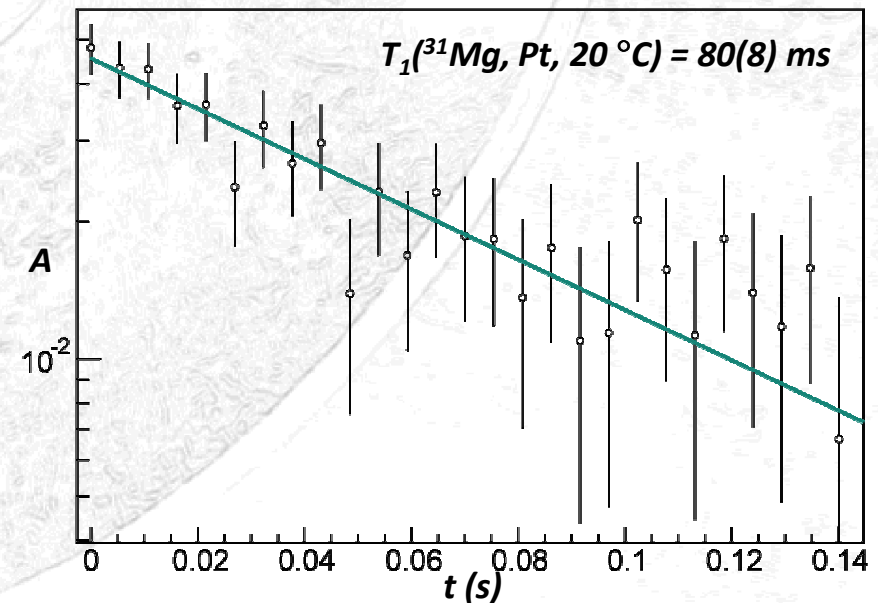
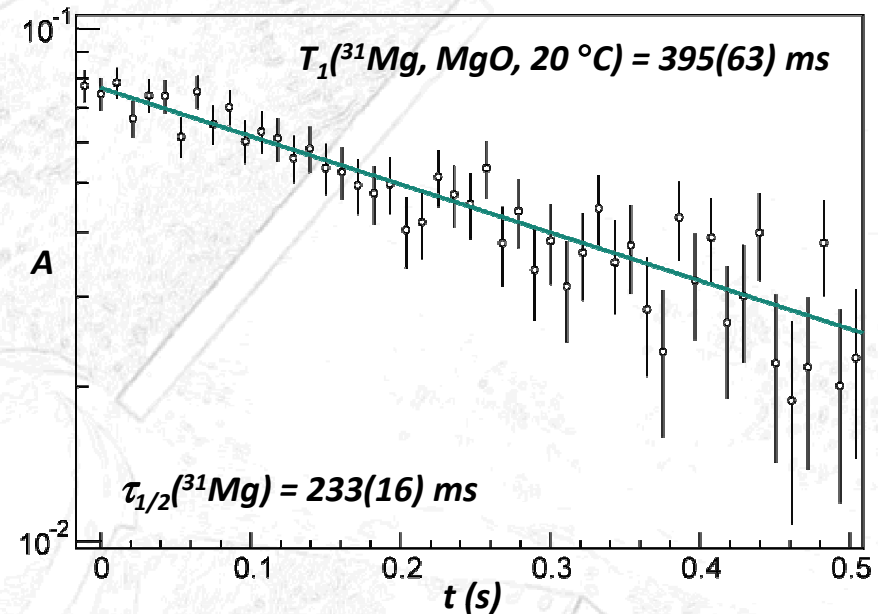
Relaxation

Cooling to either N_2 or He temperatures will be needed for:

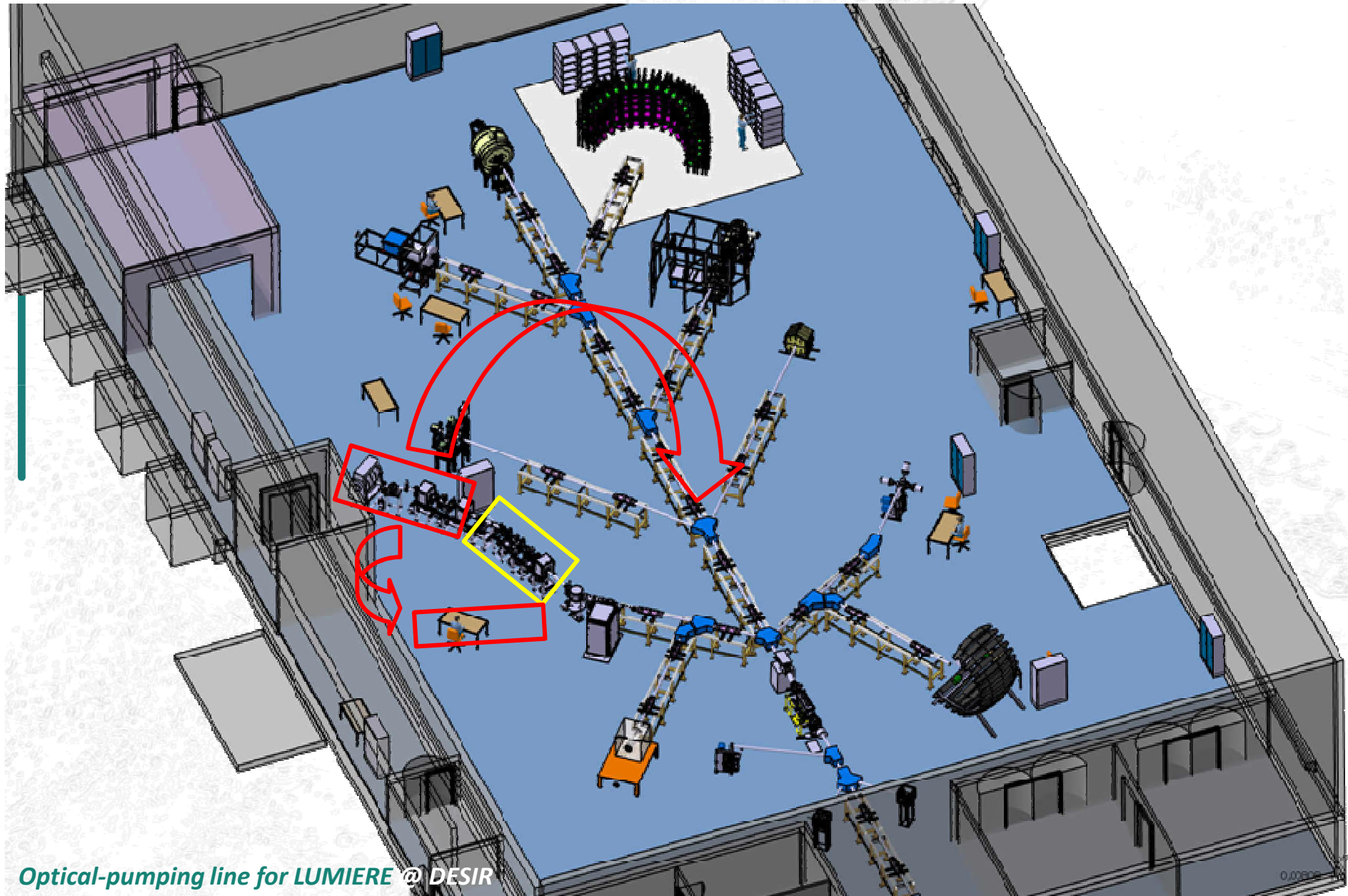
- half-lives longer than the spin-lattice relaxation time ($\tau_{1/2} > T_1$)
- field gradients measured only at low temperature

Requirements cryostat and gamma detection:

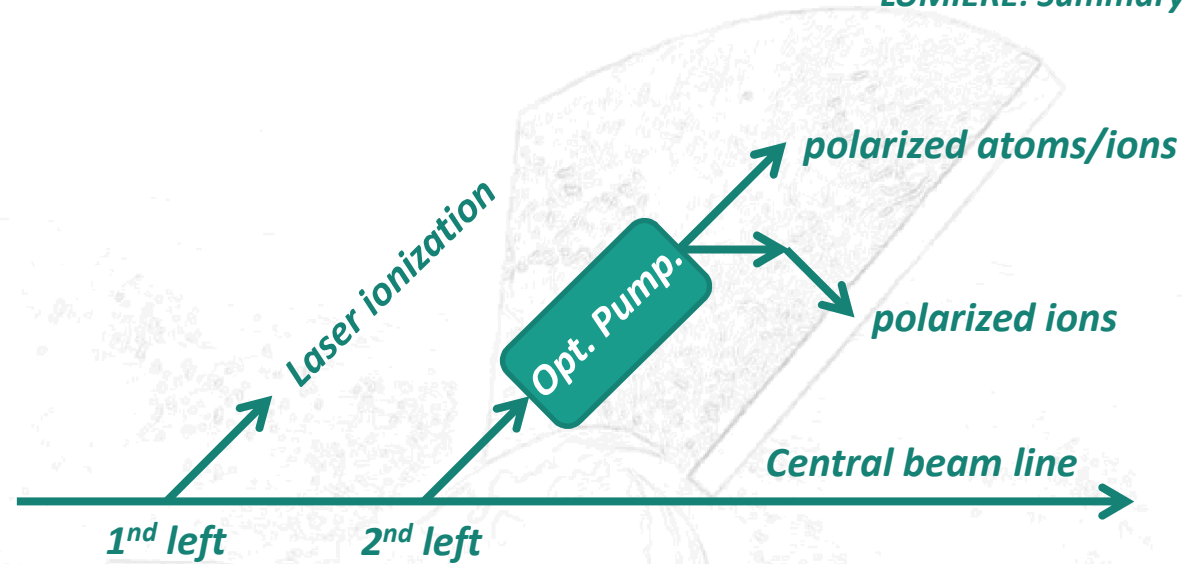
- easy access and space for dewars



Location of the optical-pumping line



Optical-pumping line for LUMIERE @ DESIR



- Dimension: 6m x 4m x 3m
- Heaviest equipment: 2000kg
- Dissipated power: 20kW (with lasers 140kW absolute max.)
- High voltage (400V): 2 × 32A
- Low current (230V): 10 × 16A
- 5 bar cooling water: 4m³/h (with lasers 7m³/h absolute max.)
- Liquid N₂: 0-40 l/day (occasionally)
- Liquid He: 0-20 l/day (rarely)
- Compressed air: yes
- nb of racks: 2
- nb of crates: 6
- nb of monitors: 4
- Maintained power: 0kW