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BioALTO platform

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An experimental platform at ALTO
for hadron therapy research

BioALTO project

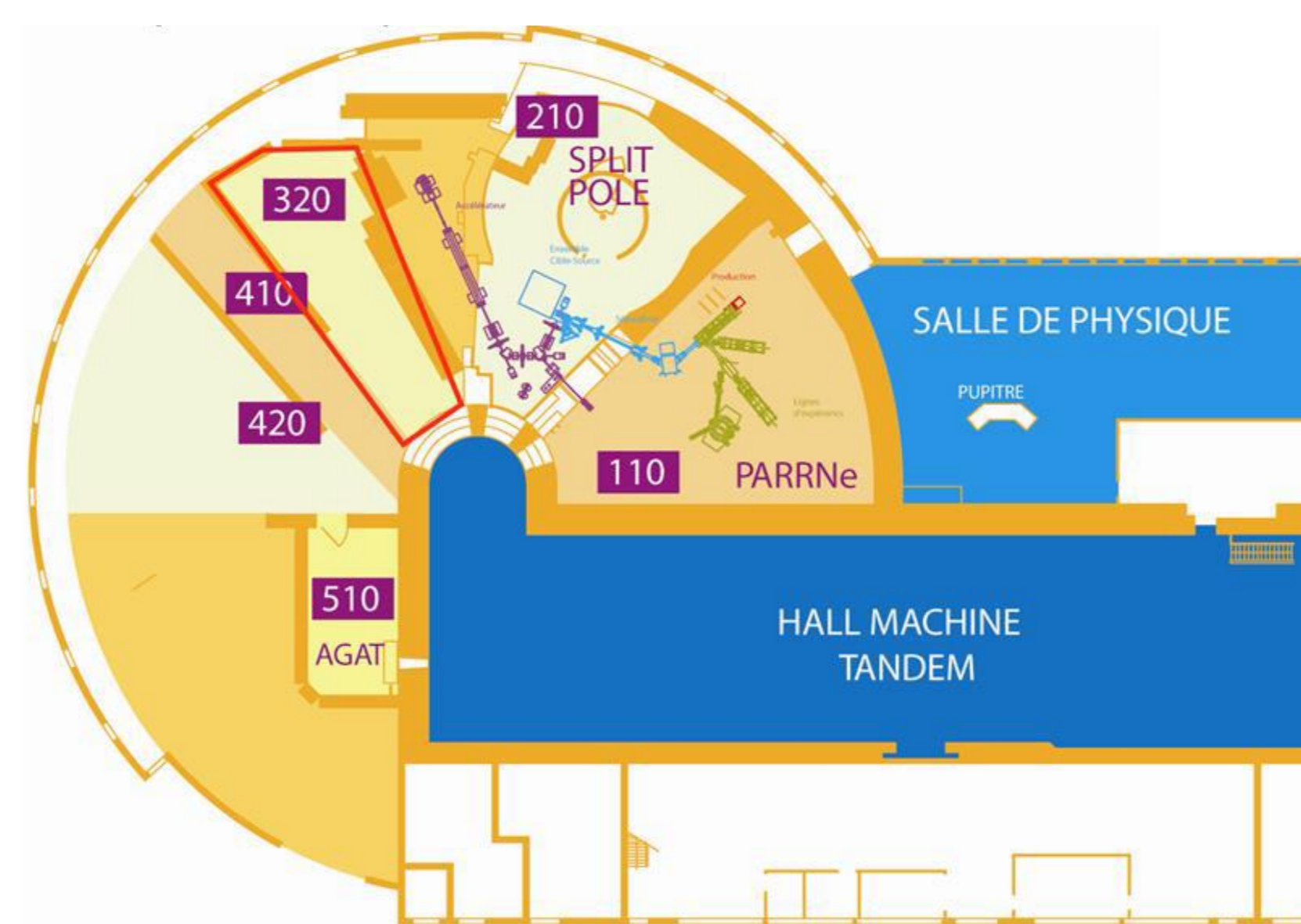
The project BioALTO presented here aims to develop a new irradiation platform open to external users at the ALTO facility (Accélérateur Linéaire et Tandem à Orsay, IJCLab), dedicated to cutting edge preclinical research of hadron therapy. The new equipment proposed for BioALTO will allow to improve one of the irradiation beam lines at ALTO by including new elements for the beam preparation and diagnostics, to develop an irradiation end-station dedicated to in vitro irradiations, and to equip a room in the premises for the preparation and analysis of biological samples.

➤ Irradiation platform IJCLab dedicated to **hadron therapy research**, from **detector characterisation** to **radiobiology**.



- 14.8 MV Tandem « Van de Graaf » accelerator
- Wide range of intense (up to μA) ion beams ($^1\text{H} - ^{127}\text{I}$)
- Continuous beam
- Additional pulsed beam possible (100 ns to 100 μs)

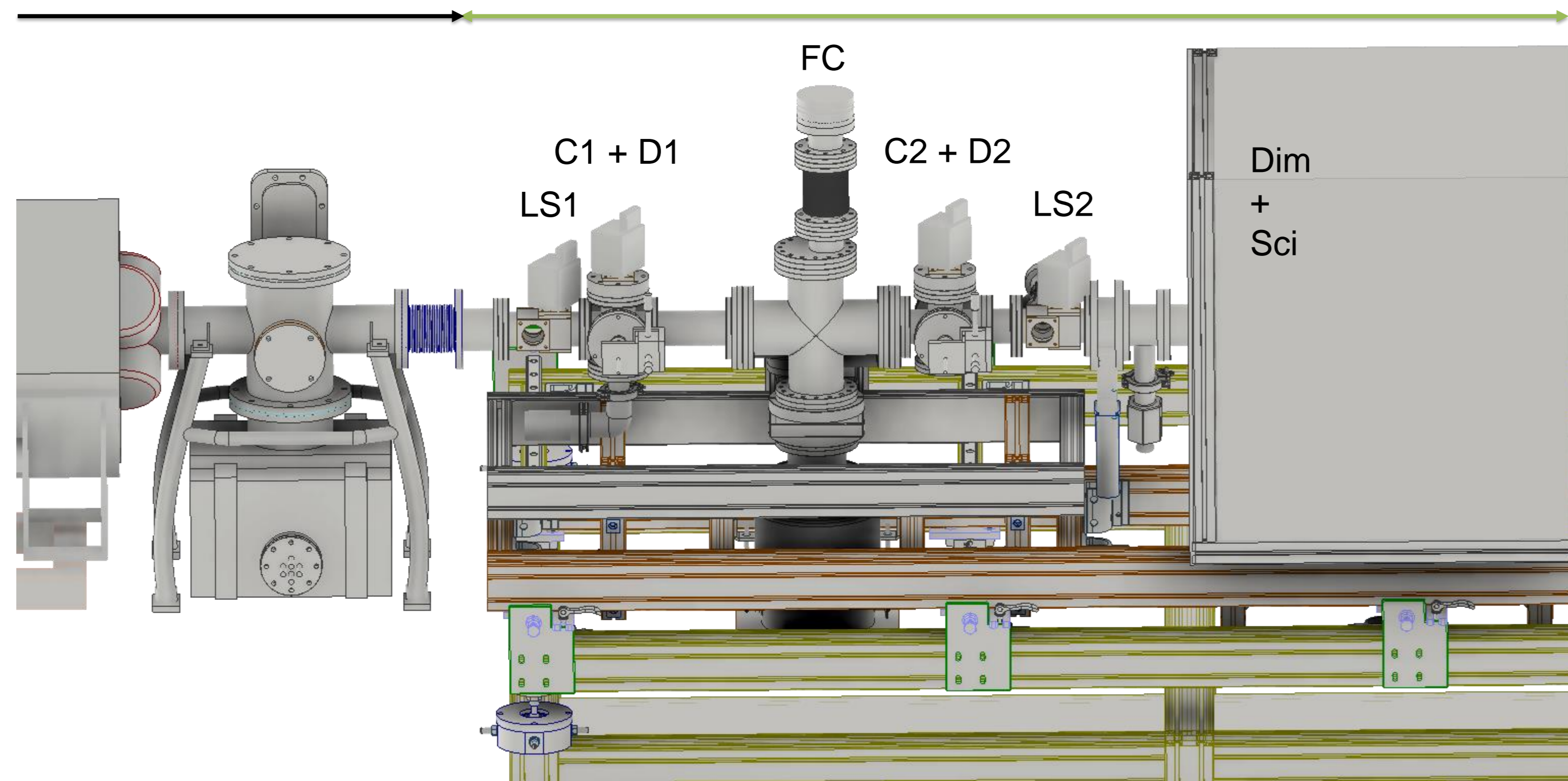
Ions	Maximum energy (MeV)
p	25
α	43
Li	50
C	87



Schematic plan of the ALTO facility and photograph of the Tandem

ALTO beam line

BioALTO beam line



Schematics of the irradiation platform in room 320

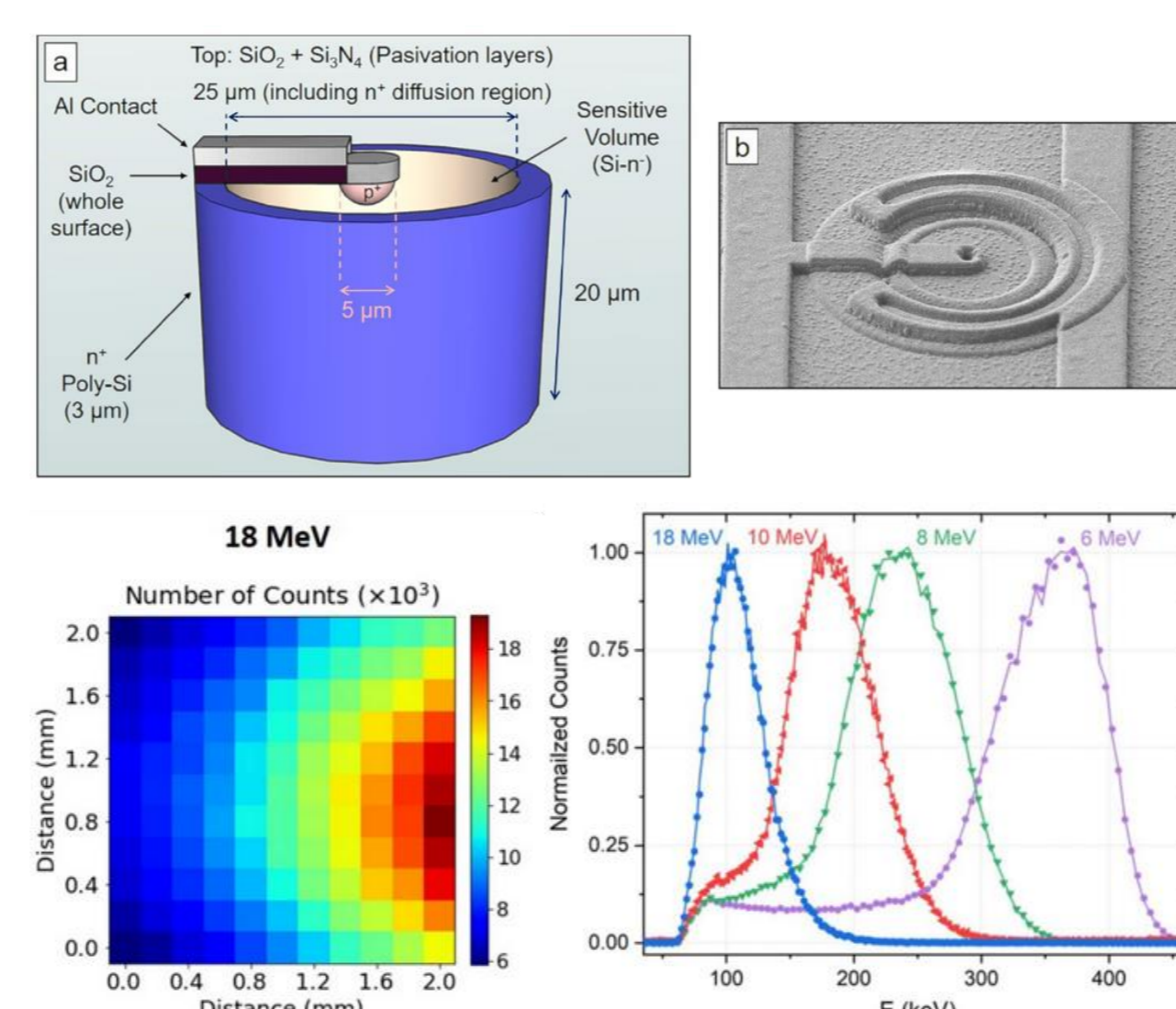
Development of a line adapted to the characteristics of ALTO

- Beam shaping with collimators (C) and double scattering (D)

Dosimetry Beam dosimetric characterisation

- Microdosimeter based on Si microdetectors
- Radiochromic films
- Si detectors

Microdosimeter detector

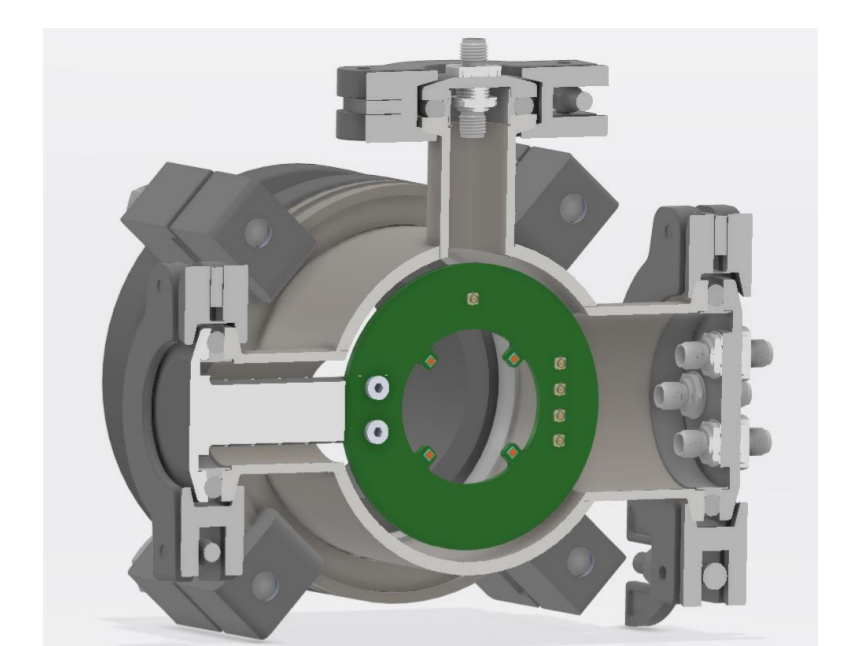


D. Bachiller-Perea et al., Sci Rep (2022) 12, 12240.

Beam monitoring

Development and integration of beam diagnostic

- Diamond counter (Dim)
- Scintillating fiber counter (Sci)
- Luminescent targets (LS)
- Faradays cups (FC)



Diamond beam monitor

Applications

Radiobiology / Detector characterisation

- Temperature-controlled enclosure
- XY motorized sample holder
- Automated sample changing
- Homogeneous fields of 2 cm diameter
- Dose rates of 2 Gy/min



- Access to the cell culture lab (L2) at Pôle Santé

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