

Provision and Use of the Microbeam facility SNAKE for low dose research

G. Dollinger

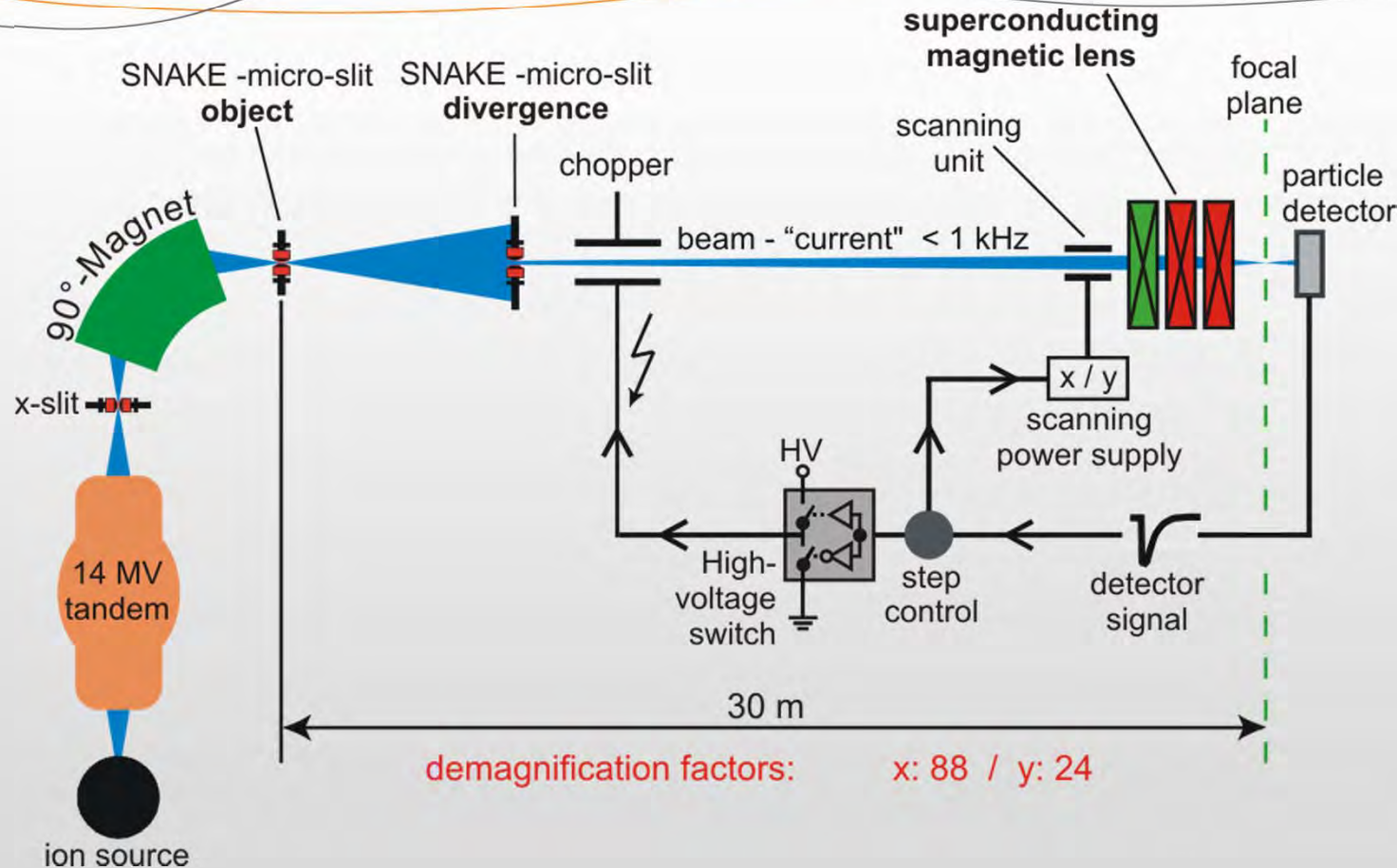
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SNAKE for cell microirradiation

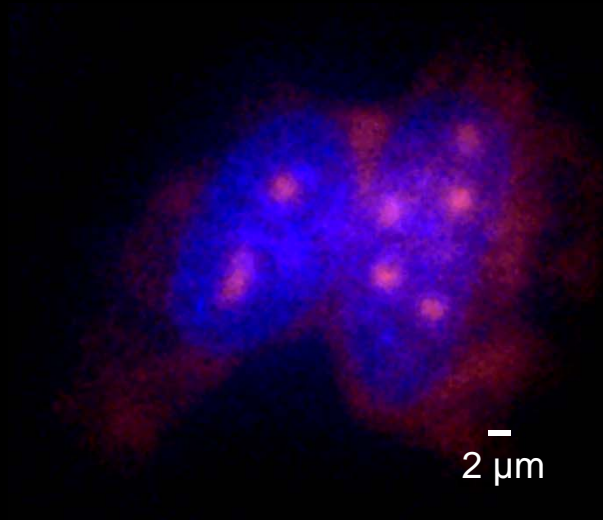
Superconducting Nanoscope for Applied nuclear (Kern-) physics Experiments
Hable et al. NIM B 267 (2009) 2090, Drexler et al, Rad. Oncology 10 (2015) 42



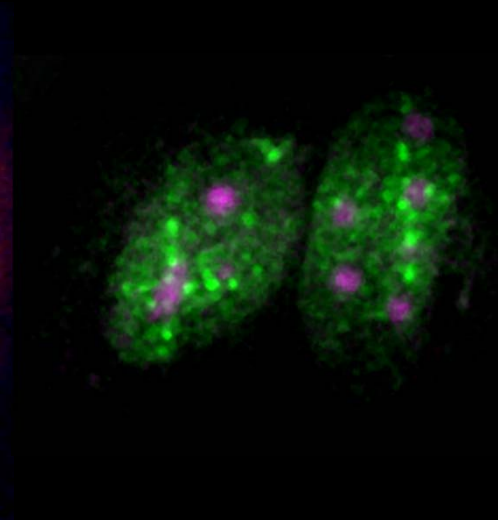
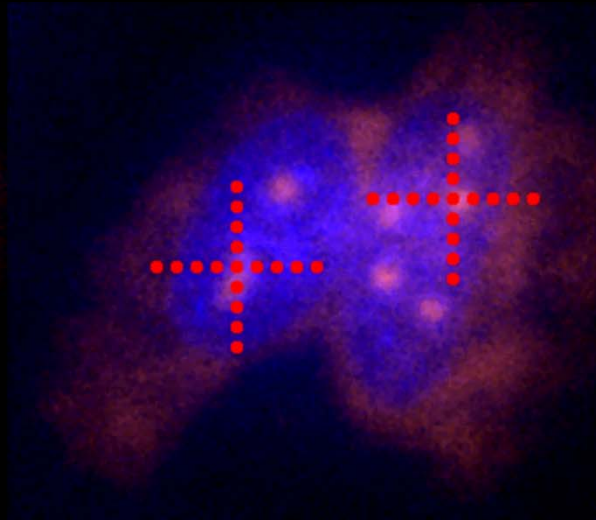
- Beam resolution $\approx 0.5 \mu\text{m}$ (fwhm)
- low LET: 20 MeV protons (2.6 keV/ μm)
- Single ion irradiation facility
- high LET heavy ions (10 – 2000 keV/ μm)

Irradiation of nucleoli

C. Siebenwirth et al, NIM B 348 (2015) 137



U2OS-MDC1-GFP cells, online @ SNAKE
DNA (ToPro3)
Nukleoli and cytoplasm (Syto83)



Immuno-stained offline
 γ -H2AX
Nukleoli (Syto83)

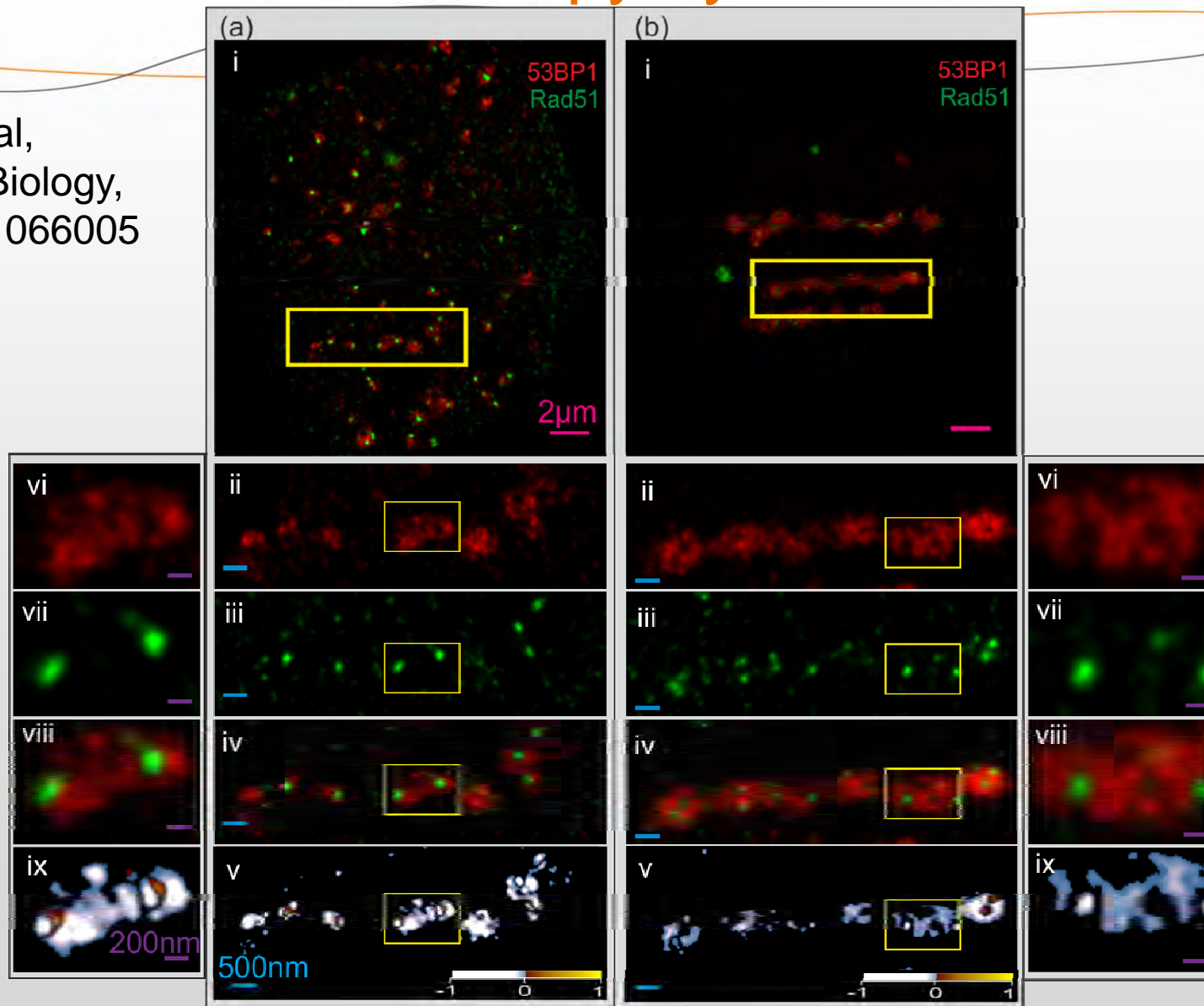
=> Targeting accuracy:

$$\Delta X = 0.4 \mu\text{m} \pm 0.7 \mu\text{m (SD)}$$

$$\Delta Y = -0.2 \mu\text{m} \pm 0.4 \mu\text{m (SD)}$$

Ultrahigh-Resolution Fluorescence microscopy by STED

Reindl et al,
Physical Biology,
12 (2015) 066005



Goals

Targeting substructures in cells:

- Cell nuclei
- Nucleoli
- Rim or center of nuclei
- Hetero- versus euchromatin

Questions to be addressed:

- Does the cell response depend on the location of DNA lesions?
- Does the fine structure of DNA repair foci tells us more about details of DNA repair?
- SNAKE offered for other users within CONCERT