Properties of 2D Thermoluminescence Dosimetry System in therapeutic scanning ion beams

Jan Gajewski
Institute of Nuclear Physics, Kraków, Poland
&
Department of Radiation Dosimetry, Nuclear Physics Institute
Academy of Science of Czech Republic
&
Proton Therapy Center in Prague, Czech Republic

Supervisor: Prof. Dr hab. Paweł Olko

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Thermoluminescence is an emission of light by certain materials during heating after previous irradiation.

Amount of light $\propto$ absorbed dose
**TL DOSIMETRY SYSTEM**

**TL Foils:**
- water resistance and flexible
- up to 20 x 20 cm²
- reusable
- dose response 0.1-20 Gy

**TL Reader:**
- heater size 200 x 200 mm²
- resolution 1024 x 1024 px²
- easy and safe to use
- pixel size ~0.2 mm
**DOSIMETRY PROPERTIES**

*Amount of light* \(\propto\) *absorbed dose*

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Signal depends on energy and type of ions
More than 20 equivalent irradiations and readouts

Repeatability was found below 3%
SCANNING ION BEAM

Pencil narrow beam is deflected by magnets scanning single plane

The depth (plane) is changed by changing the energy
SCANNING BEAM SINGLE SPOTS GEOMETRY

- Positions agree in <1% (~0.3mm)
- Shapes the same in ~10%

Reference methods:
- Fluka simulations
- Kodak® EDR2 films
- Multiwire Proportional Chamber

Published soon
SCANNING BEAM FIELD UNIFORMITY

Uniformly irradiated fields = hundreds of spots
PLANS FOR PTC IN PRAGUE

- Prepare procedures of using the TL system for QA of scanning beam
- Test some other solutions of readout process
- Prepare software for automatic image analysis

Use the system in commissioning of scanning beam at Bronowice Cyclotron Center
Thank You for Your attention