

# Dosimeter

## Fluorescence chamber for measuring ionizing radiation

Reference no. P 162

### BACKGROUND

Many different types of active dosimeter are known for measuring doses of ionizing radiation. However, they quickly run up against their limits when measuring very high doses of radiation that are produced within very short spaces of time ( $< 1$  ns). Radiation fields of this kind are found in laser plasma accelerators, free-electron lasers (FEL) and in FLASH radiotherapy.

### SOLUTION

A pulse of radiation like this leads to energy deposition in matter within picoseconds or even femtoseconds. In the case of a fluorophore (e.g. air), some of this is emitted as fluorescent light with a lifetime of a few nanoseconds. A measuring chamber with a light sensor is used for this purpose, with the measuring chamber being filled with a fluorophore and being lightproof such that no light can enter the measuring chamber from the surroundings. The light sensor is configured to detect the fluorescent light generated by ionizing radiation in the fluorophore and to generate a signal that is proportional to the dose of the pulse of radiation.

### ADVANTAGES

- Measurement of the dose of radiation in ultra-short pulse lasers (pulse duration in the range of picoseconds, femtoseconds, or shorter)
- Short response time (of less than 10 ns and preferably of less than 5 ns) allows for accurate measurement of the dose of radiation for short pulses of radiation

### FIELDS OF APPLICATION

- Ultra-short pulse lasers
- Laser plasma acceleration
- Free-electron laser
- FLASH therapy

### PROPERTY RIGHTS

EP 4020018 A1  
US 11747489 B2

### POSSIBILITIES FOR COLLABORATION

- Licensing
- R&D cooperation



Fig. 1: Fluorescence detector (blue circle) at the ARES accelerator at DESY during FLASH therapy studies.

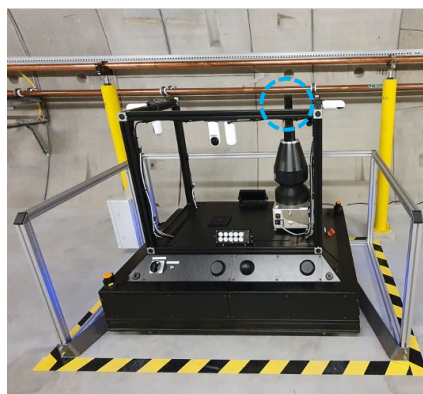


Fig. 2: Fluorescence detector (blue circle) at the European XFEL on the robot MARWIN4 for measuring synchrotron radiation.

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