**Docket #:** S19-181

# 3D High Speed RF Beam Scanner for Hadron Therapy of Cancer

Stanford researchers have developed a novel technique to control proton beams for radiation therapy to deliver a very high, full dose across a tumor in less than one second. This fast and powerful approach controls the lateral position and depth of penetration of proton beams using an RF accelerator mounted at the end of a gantry.
Overcoming challenges of existing systems, this new proton beam with its precision and compact footprint, enables FLASH delivery (very high dose rate, short duration) which is an emerging technique in radiation therapy. The flexible design is compatible with any proton source and can be retrofitted to existing systems.

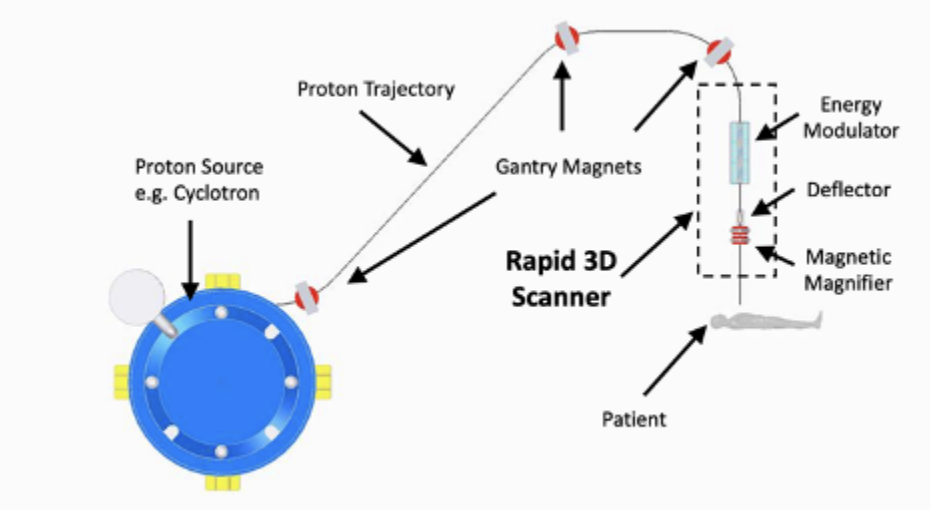


**Figure description -** *Image credit: Tantawi Lab*

**Stage of Development**

- **Prototype** of the energy modulator completed and tested at high power
- **Prototype**of the rf deflector completed
- **Developing more advanced models**

## Applications

- **Proton/JHadron Therapy** - Radiation cancer therapy with protons

## Advantages

- **Powerful-** Can increase the dose rate for proton therapy by 50X which is needed for high-dose-rate therapy
- **Fast-**can deliver full dose of radiation therapy across a tumor in less than one second
- **More precise** with better control of depth and lateral position of proton beam delivery and by negating patient motion during treatment
- **More compact and economical** than existing proton treatment systems
- **Flexible design allows it to be compatible with any proton source**
- **Backwards compatible** – hardware can be retrofitted to existing systems
- **Enables high-dose-rate (FLASH)** radiation therapy and its biological advantages with proton beams

## Publications


- Xueying Lua, Zenghai Li, Valery Dolgashev, Gordon Bowden, Ann Sy, Sami Tantawi, and Emilio A. Nanni, A proton beam energy modulator for rapid proton therapy Review of Scientific Instruments **92** 024705 (2021)


## Patents

- Published Application: 20210060358
- Issued: 12,144,100 (USA)

## Innovators

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