GERMAN CANCER RESEARCH CENTER
IN THE HELMHOLTZ ASSOCIATION

Research for a Life without Cancer

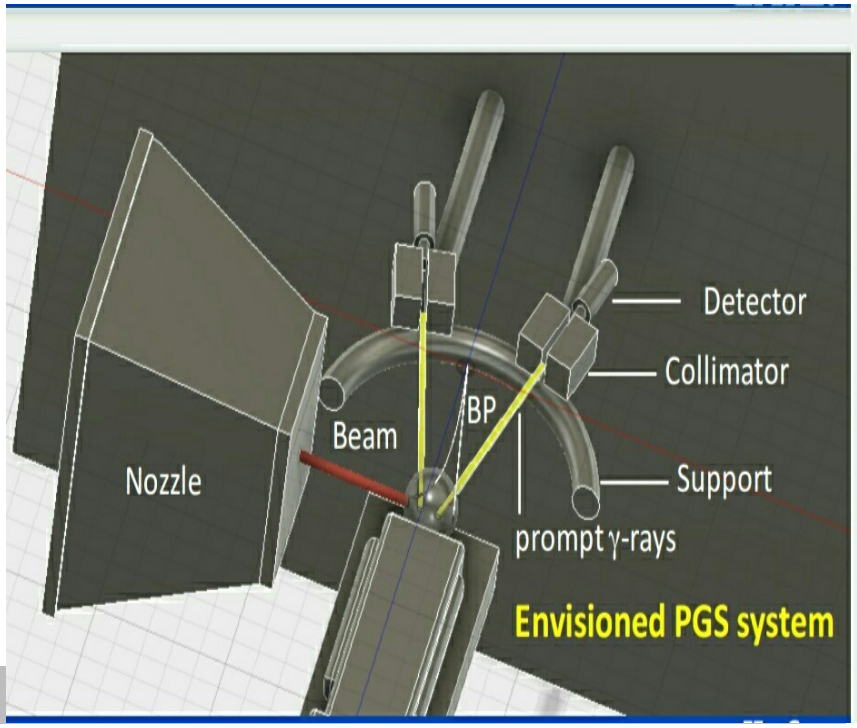
TECHNOLOGY OFFERS

A device and a method for monitoring the treatment of a patient with particles (P-1427).

Method for prompt- gamma collimation with flexible focusing windows

EXECUTIVE SUMMARY

The main goal of radiation therapy is to treat the tumor without causing significant damage to the surrounding normal tissues. The ion beam therapy provides higher potential for increased dose conformation to the target volume while sparing the healthy tissues. The verification of the treatment is crucial for the accurate dose delivery. This new device comprises a verification unit, particularly to be used for the patient treatment with the ion beam therapy. The device offers real-time beam tracking and several other advantages over the existing imaging technologies for verifying the dose delivery and the range of the ion beams.



Category	Indication	Development stage	Seeking
Device and Method	Solid cancer	Proof-of-concept completed	Licensing, Development partner

BENEFITS

- This device comprises a detection system for verification of particle beams within the patient body, which is important for online verification of the range and dose delivery.
- This can be used for the non – isotropic emission of the prompt- gamma radiation occurring after the Bragg peak in beam direction when verifying the range and the dose delivery.
- It can be used for determining the elemental composition of an irradiated target.
- It can be used for tracking high atomic number materials within the beam path.
- It can also be used for the quality assurance and plan verification before treatment.

TECHNOLOGY BACKGROUND

The device is to monitor a patient treatment with ion-beam therapy comprises a delivery unit and a verification unit. The delivery unit is responsible for particle beam delivery to the patient in a particular direction. This comprises a rotatory gantry and a patient positioning platform, which are movable with respect to each other. The gantry has a movable side and a front wall located perpendicular to each other. The verification unit contains the detector elements that are responsible for verifying a range & dose delivery of the beam particles by determining the prompt-gamma radiation generated from the particle interactions within the patient body. This may also comprise a collimator unit for shaping the prompt gamma radiation and an evaluation unit for verifying the range.

DEVELOPMENT STAGE

All the necessary measurements for range accuracy have been successully done with surrogate phantoms. The device was mainly tested with proton, helium and carbon ion beams. The results with protons (Magalhaes Martins 2017) and helium ions (Dal Bello 2019) have been published and the results with carbon ions are in the progress of being published.

APPLICATIONS

It measures the range and dose difference between the treatment plan and the data acquired during the actual treatment and is useful to avoid the treatment uncertainties and reduce safety margins. The deviations from the planned dose and range can be precisely detected and verified. This device allows online monitoring of the patient treatment with higher resolution.

INTELLECTUAL PROPERTY

A priority patent application EP19186728.2 “A device and a method for monitoring a treatment of a body part of a patient with particles” has been filed July 17th, 2019 at the European Patent Office. A further international PCT filing is intended.

PUBLICATIONS & REFERENCES

1. “**Prompt gamma spectroscopy for range control with $CeBr_3$** - ” https://doi.org/10.1515/cdbme-2017-0023 by **Paulo Magalhaes Martins** et al.”
2. “Results from the experimental evaluation of CeBr scintillators for He prompt gamma spectroscopy - https://doi.org/10.1002/mp.13594 by Riccardo Dal Bello et al.”
3. “**A full-scale clinical prototype for proton range verification using prompt gamma-ray spectroscopy –** https://doi.org/10.1088/1361-6560/aad513); by Fernando Hueso-González et al.

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ABOUT THE DKFZ Innovation Management

Working at the interface of research and industry, the Innovation Management of the German Cancer Research Center (DKFZ) helps to get new cancer medications, diagnostic tests, and research instruments onto the market as quickly as possible.

The DKFZ with its more than 3,000 employees is the largest biomedical research institution in Germany. At the Center more than 1,300 scientists investigate how cancer develops, identify cancer risk factors and endeavor to find new strategies to prevent people from getting cancer. They develop novel approaches to make tumor diagnosis more precise and treatment of cancer patients more successful. DKFZ is a member of the Helmholtz Association of National Research Centers, with ninety percent of its funding coming from the German Federal Ministry of Education and Research and the remaining ten percent from the State of Baden-Württemberg.