

ST 7: DPG meets DGMP

Time: Wednesday 16:30–18:00

Location: PC 203

Invited Talk

ST 7.1 Wed 16:30 PC 203

Elekta Unity-Beschleuniger; Neue Wege in der Strahlentherapie Technische Lösung * Klinischer Workflow * Projektumsetzung — ●MICHAEL ROSSI — Elekta GmbH Borsteler Chaussee 49, 22453 Hamburg

Elekta Unity * MR-Beschleuniger Neue Wege in der Strahlentherapie Technische Lösung * Klinischer Workflow * Projektumsetzung

Präsentiert wird die technische Umsetzung von der ersten Entwicklung in UMC Utrecht bis zur klinischen Realisierung durch Elekta. Fokussiert wird dabei auf den klinischen Workflow, den klinischen Nutzen und Gating-Verfahren (CMM). Im Weiteren wird auf die projektseitige Umsetzung intensiv eingegangen. Dies umfasst das Projekt selbst, die örtlichen Grundvoraussetzung für die Installation, das Schulungsprogramm für den Anwender und die physikalischen Aspekte des Trainings.

Elekta Unity - MR accelerator New ways in radiotherapy Technical solution - clinical workflow - project realisation

The technical implementation from the first development in UMC Utrecht to the clinical realisation by Elekta will be presented. The focus is on the clinical workflow, the clinical benefits and the gating procedure (CMM). Furthermore, the project-side realisation is discussed in detail. This includes the project itself, the basic local requirements for the installation, the training programme for the user, and the physical aspects of the training.

Invited Talk

ST 7.2 Wed 17:00 PC 203

About Mountaineers and Explorers: Frontiers of Ultrahigh Field Magnetic Resonance — ●THORALF NIENDORF — Max Delbrück Center for Molecular Medicine in the Helmholtz Association, Berlin, Germany — Charite - University Medicine, Berlin, Germany

Progress in the understanding of ultrahigh field magnetic resonance (UHF-MR) physics provides meaningful technologies for the advancement of biomedical and diagnostic MRI. The argument for moving 7 T MRI into clinical applications is more compelling than ever. Images from these instruments have revealed new aspects of anatomy, function and physio-metabolic characteristics of the neurovascular and cardiovascular systems, as well as other organs with unparalleled detail. With 7 T human MRI now present in the clinic, there is increasing

interest in exploring ever higher magnetic field strengths. That makes this a perfect moment to review the current state of UHF-MR. The presentation surveys the development of novel methodology and technology, frontier human studies, breakthrough clinical applications and future directions of UHF-MR. At the moment some of these new concepts and clinical applications are merely of proof-of-principle nature and vision, but they are compelling enough to drive the field forward. The speaker hopes to engage the interest of physicists, basic researchers and applied scientists, and particularly to attract young scientists and new entrants into the field. The presentation will convey the seeds of this vision and inspire you - as it has the speaker and his team - to become pioneers in these amazingly promising new areas of MR physics and biomedical research.

Invited Talk

ST 7.3 Wed 17:30 PC 203

Halbach Magnets for Applications in Medical Physics — ●PETER BLÜMLER — University of Mainz, Institute of Physics, Mainz, Germany

In recent years permanent magnets with the design that was originally proposed by Klaus Halbach [1] have found an increasing number of uses in various fields of medical physics. Their first application was in accelerator designs, then in magnetic resonance [2], magnetic particle imaging [3] and magnetic guiding [4] of nanoparticles and larger objects (e.g. endoscopes). Many of these applications are still exploratory, mainly because the Halbach design is often considered to be very elegant and optimized but also very complicated.

This talk will introduce the concept, briefly explain the construction and then focus on certain features which are unique for this magnet design, e.g. creation of homogeneous magnetic fields or gradients of variable strengths, or magnets that can be opened or closed without force. To conclude on examples of applications in medical physics and potential uses in the future.

[1] K. Halbach, Nucl. Inst. Methods 169 (1980) 1-10 doi: 10.1016/0029-554X(80)90094-4

[2] P. Blümmler and H. Soltner, (2023) Appl. Magn. Reason. 54 (2023) 1701-1739. doi: 10.1007/s00723-023-01602-2

[3] A. C. Bakenecker et al., Phys. Med. & Biol. 65 (2020) 195014 doi: 10.1088/1361-6560/ab7e7e

[4] P. Blümmler, Cells 10 (2021) 2708 doi: 10.3390/cells10102708