

From Hadrons to Therapy: Fundamental Physics Driving New Medical Advances

Monday, 5 September 2022 - Friday, 9 September 2022

**ECT*
Programme**

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Monday, 5 September 2022

Registration of participants (09:00 - 12:20)

Lunch (12:20 - 14:00)

Opening address - Aula Leonardi (14:00 - 14:15)

-Conveners: de Vera Gomis, Pablo (Universidad de Murcia, Murcia, Spain)

New experimental developments in hadrontherapy - Aula Leonardi (14:15 - 15:35)

-Conveners: de Vera Gomis, Pablo (Universidad de Murcia, Murcia, Spain)

time	title	presenter
14:15	Ionoacoustics for range verification in pre-clinical and clinical proton beam therapy	LASCAUD, Julie (Ludwig-Maximilians-Universität München, Germany)
14:55	Radioactive carbon beams for simultaneous treatment and imaging	BOSCOLO, Daria (GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany)

Coffe break (15:35 - 16:15)

New developments in the modelling of radiation propagation and effects - Aula Leonardi (16:15 - 18:15)

-Conveners: Dingfelder, Michael (East Carolina University, Greenville, USA)

time	title	presenter
16:15	On the relative role of the physical mechanisms on complex biodamage induced by carbon irradiation	TAIOLI, Simone (European Centre for Theoretical Studies in Nuclear Physics and Related Areas, Trento, Italy)
16:55	A simple procedure to generate cross section data for Monte Carlo simulations from Quantum Chemistry calculations. Example applications to Methacrylic acid.	FRANZ, Jan (Gdansk University of Technology, Gdansk, Poland)
17:35	Radiobiological model for intraoperative radiotherapy with electrons	GARCIA GÓMEZ-TEJEDOR, Gustavo (CSIC, Madrid, Spain)

Welcome dinner (pizza night) at Ristorante Pizzeria Bouganville, Via Francesco Petrarca 1/4, 38122 Trento (20:00 - 22:30)

Tuesday, 6 September 2022

New experimental developments in hadrontherapy - Aula Leonardi (09:00 - 10:20)

-Conveners: Boscolo, Daria (GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany)

time	title	presenter
09:00	FLASH in particle therapy	SECO, Joao (German Cancer Research Center (DKFZ), Heidelberg, Germany)
09:40	Modeling the FLASH mechanism on multiple scales	SCIFONI, Emanuele (TIFPA-INFN, Trento, Italy)

Coffe break (10:20 - 11:00)

New experimental developments in hadrontherapy: New experimental developments in hadrontherapy - Aula Leonardi (11:00 - 11:50)

-Conveners: Boscolo, Daria (GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany)

time	title	presenter
11:00	Enhancing prompt-gamma production for real-time dose verification in proton therapy	CARTECHINI, Giorgio (University of Trento, Trento, Italy)
11:25	A novel technology for particle beam monitoring based on thin silicon sensors	ABUJAMI, Mohammed A. A. (Università degli Studi di Torino - INFN, Torino, Italy)

Lunch (11:50 - 14:00)

Research on targeted radionuclide therapy and associated technologies - Aula Leonardi (14:00 - 15:20)

-Conveners: Conte, Valeria (Laboratori Nazionali di Legnaro LNL, Istituto Nazionale di Fisica Nucleare INFN, Legnaro, Italy)

time	title	presenter
14:00	Boron Neutron Capture Therapy, a form of hadrontherapy mediated by neutrons	BORTOLUSSI, Silva (University of Pavia and INFN, Unit of Pavia, Pavia, Italy)
14:40	Production of alpha emitters for cancer therapy	HOEHR, Cornelia (Life Sciences, TRIUMF Canadian Particle Accelerator and University of Victoria, Canada)

Coffe break (15:20 - 16:00)

Research on targeted radionuclide therapy and associated technologies - Aula Leonardi (16:00 - 17:20)

-Conveners: Hoeher, Cornelia (Life Sciences, TRIUMF Canadian Particle Accelerator and University of Victoria, Canada)

time	title	presenter
16:00	Cyclotron-based production of innovative radionuclides for medicine	PUPILLO, Gaia (INFN-LNL, Legnaro, Italy)
16:40	Production of unconventional radioisotopes, radiochemistry development and preclinical studies for cancer theranostics at TRIUMF	YANG, Hua (TRIUMF Canadian Particle Accelerator, Vancouver, Canada)

Wednesday, 7 September 2022

Need for accurate particle-impact cross sections and Monte Carlo simulations - Aula Leonardi (09:00 - 10:20)

-Conveners: Franz, Jan (Gdansk University of Technology, Gdansk, Poland)

time	title	presenter
09:00	Need of positron impact cross sections: Ionisation cross section calculations	SINHA, Nidhi (Korea Institute of Fusion Energy, Gunsan, South Korea)
09:40	Relativistic quantum theory for modeling electron scattering	TRIGGIANI, Francesca (Università degli Studi di Camerino-Dipartimento di Fisica; Sezione INFN Perugia, Italy)

Coffe break (10:20 - 11:00)

Advanced devices to measure energy deposition at the micro- and nanoscales - Aula Leonardi (11:00 - 12:20)

-Conveners: Scifoni, Emanuele (Trento Institute for Fundamental Physics and Application TIFPA-INFN, Trento, Italy)

time	title	presenter
11:00	Silicon-on-insulator microdosimetry: new domain of quality assurance in particle therapy	ROSENFELD, Anatoly (University Of Wollongong, Centre for Medical Radiation Physics, Wollongong, Australia)
11:40	Microdosimetry with mini-TEPC in hadrotherapy	CONTE, Valeria (INFN - Laboratori Nazionali di Legnaro, Legnaro (PD), Italy)

Lunch (12:20 - 14:00)

Nanoscale radiation damage to DNA: experimental and modelling perspectives - Aula Leonardi (14:00 - 16:00)

-Conveners: Garcia Gómez-Tejedor, Gustavo (CSIC, Madrid, Spain)

time	title	presenter
14:00	Applications of Nanodosimetry in Particle Therapy Planning	RUCINSKI, Antoni (Institute of Nuclear Physics Polish Academy of Sciences, Kraków, Poland)
14:40	Nanoscale radiation damage to cellular DNA: bond-breaking mechanisms of secondary low energy electrons and their medical applications	SANCHE, Leon (Université de Sherbrooke, Sherbrooke, Canada)
15:20	Low-Energy Electron Damage to Plasmid DNA in Thin Films: Experimental parameters and DNA radiosensitization by terpyridine-Pt	ZHENG, Yi (Fuzhou University, Fuzhou, China)

Coffe break (16:00 - 17:15)

Visit to Trento Protontherapy Centre (17:15 - 19:30)

A bus will pick up participants at ECT at 17:30h to bring them to the Trento Protontherapy Centre, where a guided visit will be performed. After the visit, around 19h, the bus will pick up again participants at the Protontherapy Centre to bring them to the restaurant for the social dinner downtown.*

-Conveners: Scifoni, Emanuele (TIFPA-INFN, Trento, Italy)

Social dinner at Ristorante Antica Trattoria Due Mori, Via S. Marco 11, 38122 Trento (19:30 - 23:00)

Thursday, 8 September 2022

Nanoscale radiation damage to DNA: theoretical perspectives - Aula Leonardi (09:00 - 10:20)

-Conveners: Kohanoff, Jorge (Instituto de Fusión Nuclear, Universidad Politécnica de Madrid, Madrid, Spain)

time	title	presenter
09:00	Excitation and ionisation cross-sections of charged particles in condensed-phase biologically-relevant materials	DE VERA GOMIS, Pablo (Centro de Investigación en Óptica y Nanofísica, Universidad de Murcia, Murcia, Spain)
09:40	Understanding solvation effects on proton irradiation of DNA from RT-TDDFT simulations	MUÑOZ-SANTIBURCIO, Daniel (Universidad Politécnica de Madrid, Madrid, Spain)

Coffe break (10:20 - 11:00)

Nanoscale radiation damage to DNA: theoretical perspectives - Aula Leonardi (11:00 - 12:20)

-Conveners: Taioli, Simone (European Centre for Theoretical Studies in Nuclear Physics and Related Areas, Trento, Italy)

time	title	presenter
11:00	Low-energy electrons and DNA: A perspective from first-principles simulations	KOHANOFF, Jorge (Instituto de Fusión Nuclear, Universidad Politécnica de Madrid, Madrid, Spain)
11:40	DNA radiation damage in the nucleosome: the molecular dynamics perspective	CLERI, Fabrizio (University of Lille, Lille, France)

Lunch (12:20 - 14:00)

Enhancing radiotherapy by means of nanotechnology - Aula Leonardi (14:00 - 15:20)

-Conveners: Shinpaugh, Jefferson (East Carolina University, Greenville, USA)

time	title	presenter
14:00	Contrast-enhanced synchrotron radiation therapy: From bench to bedside	ELLEAUME, Hélène (INSERM French Institute of Health and Medical Research, Bron, France)
14:40	High Z-elements and low energy radiation to improve efficacy of radiotherapy: mechanistic aspects	RAVANAT, Jean-Luc (CEA Grenoble, France)

Coffe break (15:20 - 16:00)

Enhancing radiotherapy by means of nanotechnology - Aula Leonardi (16:00 - 17:20)

-Conveners: Cordoni, Francesco Giuseppe (University of Trento, Trento, Italy)

time	title	presenter
16:00	Experimental and computational studies of nano-structured gold as a radiosensitizer for proton and carbon ion radiation	SHINPAUGH, Jefferson (East Carolina University, Greenville, USA)
16:40	Track structure simulations in nano sized geometries	DINGFELDER, Michael (East Carolina University, Greenville, USA)

Friday, 9 September 2022

Practical and clinical aspects of radiotherapy - Aula Leonardi (09:00 - 10:05)

-Conveners: Tommasino, Francesco (University of Trento, Trento, Italy)

time	title	presenter
09:00	Proton imaging for hadrontherapy: status and prospects	DEDES, George (Department of Medical Physics, Ludwig-Maximilians-Universität München, Germany)
09:40	Proton therapy x-ray CT calibration by proton tomography	FOGAZZI, Elena (University of Trento, Trento, Italy)

Coffe break (10:05 - 10:50)

Practical and clinical aspects of radiotherapy - Aula Leonardi (10:50 - 12:10)

-Conveners: Tommasino, Francesco (University of Trento, Trento, Italy)

time	title	presenter
10:50	Organ motion in proton therapy: clinical mitigation techniques of the interplay effect	FRACCHIOLLA, Francesco (Trento Proton Therapy Center, Trento, Italy)
11:30	Protontherapy: state of the art and challenges	CIANCHETTI, Marco (Trento Proton Therapy Center, Trento, Italy)

Lunch (12:10 - 14:00)

Closing panel discussion - Aula Leonardi (14:00 - 15:00)

The aim of the open discussion is to recap the contents of the workshop and draw final conclusions (moderated by the members of the Organising Committee). Given the multidisciplinary character of the participants and their very different research approaches, this final discussion will attempt to identify overlapping interests, provide recommendations for further collaboration, and identification of challenges requiring synergistic efforts.

-Conveners: de Vera Gomis, Pablo (Universidad de Murcia, Murcia, Spain)