

3rd Summer School in Medical Physics: Applied Computational Methods for Radiotherapy

Online Phase: 06.09. – 01.10.2021

1. Recordings:

Recording = 45 min.

Recording	Topic	Speaker
Recording 1	Introduction to Online phase	Marcel Schäfer
Recording 2	New trends in Computed Tomography	Stefan Sawall
Recording 3	MR Imaging and MR guidance	Oliver Jäkel
Recording 4	The Medical Imaging Interaction Toolkit (MITK)	André Klein
Recording 5	Competing methods of image processing in RT	Kristina Giske
Recording 6	Medical Image computing	André Klein
Recording 7	Digital patient twins for adaptive RT	Kristina Giske
Recording 8	Computational Methods for Radiochemistry with applications to mini-/micro-beams and FLASH	Joao Seco
Recording 9	Introduction to radiobiological modelling in radiotherapy	Christian Karger
Recording 10	Radiomics	Anoshirwam Andrej Tavakoli
Recording 11	Numerical methods & simulations for radiotherapy dose calculation and treatment planning	Niklas Wahl

Duration of Online Test: 27.09. – 03.10.2021

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2. Online Sessions

Date	Time (CEST)	Topic	Speaker
07.09.2021	16.00 – 16.10	Online: Welcome and Introduction	All participants
	16.10 – 16.30	Introduction and expectations	Simone Barthold-Beß, Marcel Schäfer & all participants
	16.30 – 16.45	Online: Introduction online teaching	Marcel Schäfer
	17.00 – 18.00	Computational Methods for RT – Overview	Martin Frank
09.09.2021	16.00 – 16.45	Online: Basics of Clinical Computed Tomography	Stefan Sawall
	16.45 – 16.55	Discussion and Questions	All participants
	17.00 – 17.45	Online: The role of medical image understanding in RT	Kristina Giske
	17.45 – 18.00	Discussion and Questions	All participants
14.09.2021	16.00 – 16.45	Online: Application of the linear-quadratic model	Christian Karger
	16.45 – 16.55	Discussion and Questions	All participants
	17.00 – 17.45	Online: Advanced radiobiological models	Christian Karger
	17.45 – 18.00	Discussion and Questions	All participants
23.09.2021	16.00 – 16.45	Online: Introduction to Monte Carlo particle transport method	Lucas Burigo
	16.45 – 16.55	Discussion and Questions	All participants
	17.00 – 17.40	Online: Monte Carlo applications in medical physics	Joao Seco
	17.45 – 18.00	Discussion and Questions	All participants
28.09.2021	16.00 – 16.45	Online: Inverse Treatment Planning and Optimization	Niklas Wahl
	16.45 – 16.55	Discussion and Questions	All participants
	17.00 – 17.45	Online: Uncertainty mitigation in Radiotherapy treatment planning	Niklas Wahl
	17.45 – 18.00	Discussion and Questions	All participants
	Weekly	Online meeting room “virtual coffee break” (upon request)	All participants

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Live Online Phase: 04. – 08.10.2021

Date	Time (CEST)	Topic	Speaker	
04.10.2021	13.00 – 13:45	Welcome of participants Overview on medical physics research in HD – contributing institutes	Oliver Jäkel	
	13:45 – 14:30	Application and Validation of Machine Learning in Prostate MRI	David Bonekamp	
	14.30 – 15.00	Break		
	15.00 – 16.30	RBE-models in particle radiotherapy & Clinical application of RBE-models in particle radiotherapy	Christian Karger	
	16.30 – 17.00	Break		
	17.00 – 17.30	Welcome by Heidelberg University & Studying in Heidelberg	International Office, Heidelberg University: Nicoline Dorn	
05.10.2021	13.00 – 13.30	Hands-on Treatment Planning: Introduction & Set-Up	Niklas Wahl	
	13.30 – 15.00	IMRT: Photon dose calculation & optimization	Niklas Wahl	
	15.00 – 15.30	Break		
	15.30 – 17-00	Hands-on: IMRT with matRad	Niklas Wahl	
	06.10.2021	13.00 – 14.00	Monte Carlo (MC) in practice: simulation design	Lucas Burigo
		14.00 – 15.00	Monte Carlo (MC) in practice: analysis and optimization	Lucas Burigo
	15.00 – 15.30	Coffee Break		
	15.30 – 16.15	Monte Carlo (MC) application in dose calculations	Lucas Burigo	
	16.15 – 17-00	Monte Carlo (MC) application in radiobiology and radiochemistry	Lucas Burigo	

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Date	Time (CEST)	Topic	Speaker
07.10.2021	13.00 – 15.00	Image registration revisited: rigid for IGRT (& GPGPU), deformable for ART, multimodal for MRgRT	Kristina Giske
	15.00 – 15.30	Coffee Break	
	15.30 – 17.00	Segmentation revisited: OARs & Targets, DL-based patient model synthesis	Kristina Giske
08.10.2021	13.00 – 15.00	MITK Hands on 1: Exercises	André Klein
	15.00 – 15.30	Coffee Break	
	15.30 – 17.00	MITK Hands on 2 Exercises	André Klein
	17.00 - 17.30	Summary and wrap up Closing	All participants, Oliver Jäkel