

# Krakowska Interdyscyplinarna Szkoła Doktorska

## Opis przedmiotu/ course description

<b>Przedmiot/ Course :</b>	Wykład specjalistyczny Oddziału Badań Interdyscyplinarnych (NO5) i Oddziału Zastosowań Fizyki (NO6)
<b>Moduł kształcenia/ Training module:</b>	Moduł specjalistyczny
<b>Okres realizacji/ Implementation period :</b>	np. II rok, semestr zimowy
<b>Język wykładowy/ Language:</b>	język angielski/ English
<b>Prowadzący/ Lecturer:</b>	dr hab. Władysław Węglarz, Prof. IFJ PAN/Oddział Badań Interdyscyplinarnych  dr hab. Jakub Bielecki, dr Axel Jardin, dr hab. Marek Scholz/Oddział Zastosowań Fizyki
<b>Wymiar godzin przedmiotu/duration :</b>	30 godzin
<b>Forma prowadzenia zajęć/ Form of teaching :</b>	Wykład 26 godzin/ seminaria 4 godziny
<b>Opis przedmiotu/ course content:</b>	<p>Selected methods of biomedical imaging for physicists (15h) The topics of the lecture include: - basics of nuclear magnetic resonance - discussion of physical, technical and computational issues used to obtain optimized MR images - discussion of the physical foundations of selected MR imaging methods (structural imaging, diffusion tensor imaging, perfusion imaging, functional imaging, localized spectroscopy, CEST), and examples of their use for imaging of living organisms and for material research. In particular, various ways of obtaining contrast of images and interpretation of the information contained in them regarding the physico-chemical properties of the examined objects and the use of this information in neurological, cardiological or oncological issues as well as in material research in the field of pharmacy, geology and food technology will be explained. - discussion of physical basics of computed tomography (CT) and imaging methods based on use of radioactive markers (PET, SPECT)</p> <p>Optionally, it is possible to show the operation of MR 9.4T imaging equipment used at the Institute of Magnetic Resonance Tomography IFJ PAN.</p>

	<p><b>How to ignite a star on Earth, or energetic Eldorado (15h)</b></p> <p>A serious lecture in a playful form about the future of energy harvesting. The lecture will be composed of several topics expressed as a list of the following questions:</p> <ul style="list-style-type: none"> <li>▪ Why do we want to ignite a star on Earth?</li> <li>▪ Which requirements should be fulfilled to achieve nuclear fusion in a star on Earth?</li> <li>▪ Rutherford's problem → Let there be plasma! What is plasma and how to think about it?</li> <li>▪ How to use the plasma properties to confine our star on Earth?</li> <li>▪ Is it real? The ITER project: modern Tower of Babel or new energetic Eldorado?</li> </ul>
<p><b>Efekty uczenia się wg 8PRK zgodnie z Programem kształcenia KISD/ learning outcomes at level 8 of the PRK according to the KISD Training Program:</b></p>	<p>EU1, EU2, EU3, EU8, EU9, EU13, EU15</p>
<p><b>Forma weryfikacji efektów uczenia się/ Method of verification of learning outcomes:</b></p>	<p>esej/ essay</p>
<p><b>Wymagania wobec uczestników/ Requirements for participants:</b></p>	