

The Chinese University of Hong Kong  
Faculty of Science  
Science Academy for Young Talent

Summer Courses 2024  
Course Outline

*CUSA1095 Relativity and Particle Physics*  
*相對論與粒子物理學*

**Introduction:** This course is tailored for students who are curious about the fundamental workings of the universe. Embarking on a captivating exploration of special relativity, we will uncover the mind-bending concepts of time dilation and length contraction. We will then dive into the realm of particle physics, unravelling the mysteries of elementary particles and fundamental interactions. Students will be able to learn about the cutting-edge technologies used in particle accelerators and detectors in frontier scientific research, and gain some hands-on experience with apparatus. Come join us on this exhilarating journey as we unlock the secrets of the cosmos and inspire a lifelong passion for scientific discovery!

本課程特別為對宇宙基本運作感到好奇的學生度身打造。我們將踏上一段引人入勝的探索之旅，揭示狹義相對論中如時間膨脹和長度收縮等概念。我們更會深入粒子物理學的領域，解開基本粒子、基本相互作用的神秘面紗。此外，同學們將會學習到粒子加速器和探測器等用於前沿研究的尖端技術，並有機會親自動手操作儀器。讓我們一同展開這趟令人振奮的科學探索之旅程，解開宇宙的奧秘！

**Medium of Instruction:** Cantonese supplemented with English  
粵語輔以英語

**Organising Unit:** Department of Physics, Faculty of Science, CUHK

**Teachers:**



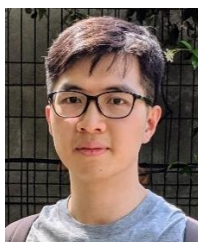
**Dr. CHENG Hok Chuen Tom (鄭學全博士)**

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**Dr. YIP Long Sang Kenny (葉朗生博士)**

Lecturer

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**Course Content:**

<p>8 August 2024 (Thursday)</p> <p>9:00 am – 12:30 pm 2:00 pm – 5:30 pm</p>	<p><b><u>Special Relativity (Dr. YIP Long Sang Kenny):</u></b> <b>Lecture:</b></p> <ul style="list-style-type: none"> <li>• Michelson-Morley experiment, postulates of special relativity and constancy of the speed of light in vacuum, time dilation, and length contraction.</li> </ul>
<p>9 August 2024 (Friday)</p> <p>9:00 am – 12:30 pm 2:00 pm – 5:30 pm</p>	<p><b><u>Special Relativity (Dr. YIP Long Sang Kenny):</u></b> <b>Lecture:</b></p> <ul style="list-style-type: none"> <li>• Lorentz transformation, twin paradox, cosmic muon lifetime, and assessment.</li> </ul> <p><b><u>Laboratory Activities:</u></b></p> <ul style="list-style-type: none"> <li>• Measurement of muon lifetime at the Department of Physics, CUHK.</li> </ul> <p><b><u>Particle Physics (Dr. CHENG Hok Chuen Tom):</u></b> <b>Lecture:</b></p> <ul style="list-style-type: none"> <li>• Historical overview and discoveries, and elementary particle dynamics.</li> </ul>
<p>10 August 2024 (Saturday)</p> <p>9:00 am – 12:30 pm 2:00 pm – 5:30 pm</p>	<p><b><u>Particle Physics (Dr. CHENG Hok Chuen Tom):</u></b> <b>Lecture:</b></p> <ul style="list-style-type: none"> <li>• Particle decays and conservation laws, relativistic kinematics, selected contemporary topics, particle detectors (at lab visit), and assessment.</li> </ul> <p><b><u>Laboratory Activities:</u></b></p> <ul style="list-style-type: none"> <li>• Experiments with particle detection devices such as cloud chambers and modern particle detectors at the Department of Physics, CUHK.</li> </ul>
<p>17* August 2024 (Saturday)</p> <p>9:00 am – 12:30 pm 2:00 pm – 5:30 pm</p>	<p>Make-up class</p>

<b>Date</b>	8, 9, 10, 17* August 2024 (21 hours)				
<b>Time</b>	9:00 am – 12:30 pm and 2:00 pm – 5:30 pm				
<b>Teaching Mode</b>	Face to Face (The Chinese University of Hong Kong)				
<b>Enrollment</b>	20 – 30				
<b>Expected Applicants</b>	Students who are promoting to or studying S4-S6 with good knowledge in mathematics and physics				
<b>Tuition Fee</b>	HKD 3,560.00				
<b>Credit</b>	1.5 Academy Unit(s)				
	<i>Students can accumulate credits which will be regarded as "Other Learning Experience" when applying University.</i>				
<b>Grading Methods</b>		<b><i>Certificate</i></b>	<b><i>Assessment</i></b>	<b><i>Attendance</i></b>	<b><i>Credit(s)</i></b>
	<b>Distinction</b>	<i>Certificate of Distinction</i>	<i>Excellent</i>	<i>&gt;75%</i>	<i>1.5</i>
	<b>Pass</b>	<i>Certificate of Merit</i>	<i>Pass</i>	<i>&gt;75%</i>	<i>1.5</i>
	<b>Attended</b>	<i>Certificate of Attendance</i>	<i>Fail</i>	<i>&gt;75%</i>	<i>0</i>
	<b>Fail</b>	<i>N/A</i>	<i>Fail</i>	<i>N/A</i>	<i>0</i>

\* This date is reserved for make-up classes in case there is any cancellation of classes due to unexpected circumstances.