Stampare su carta intestata del CdS

| General information | | |
|---|---|---|
| Academic subject | **HEAVY ION PHYSICS** | |
| Degree course | Physics (Magistrale) | |
| Academic Year | 2021/2022 | |
| European Credit Transfer and Accumulation System (ECTS) | 3 | |
| Language | ENGLISH | |
| Academic calendar (starting and ending date) | March 2021 – May 2022 | |
| Attendance | NO | |

| Professor/ Lecturer | |
|---|---|
| Name and Surname | Giacomo Volpe |
| E-mail | Giacomo.volpe@uniba.it |
| Telephone | 080 5443242 |
| Department and address | Dipartimento Interateneo di Fisica "M. Merlin", Campus Universitario<br>via Amendola 173 - 70125 Bari, ground floor, room 49 |
| Virtual headquarters | |
| Tutoring (time and day) | Always available on request |

| *Syllabus* | |
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| **Learning Objectives** | Basic notions of ultra-relativistic heavy ion collisions |
| **Course prerequisites** | Notions of nuclear and sub-nuclear physics, quantum mechanics, thermodynamic, particle detectors |
| **Contents** | Quantum Chromodynamics and the Phase Transition in Strongly Interacting Matter. The Quark Gluon Plasma (QGP). Relativistic Kinematics. Cross Section and Collision Geometry. Global properties of heavy-ion collisions. Space-time evolution of the QGP. Soft probes: Thermal photons and lepton pairs, particle multiplicity, collective flow and correlations, statistical model. Hard probes: Jet quenching. Quarkonia and Heavy Quark. Sources of relativistic and ultra-relativistic nuclei. Experimental apparatus: the ALICE experiment. Connections to other fields of physics: nuclear physics, particle physics, statistical physics, relativistic fluid dynamics, astrophysics. |
| **Books and bibliography** | |
| **Additional materials** | |

| Work schedule | | | |
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| Total | Lectures | Hands on (Laboratory, working groups, seminars, field trips) | Out-of-class study hours/ Self-study hours |
| **Hours** | | | |
| 75 | 31 | | 44 |
| **ECTS** | | | |
| 3 | 3 | | |
| **Teaching strategy** | Class lectures | | |
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| **Expected learning outcomes** | | | |
| **Knowledge and understanding on:** | Basic knowledge of ultra-relativistic nucleus-nucleus collisions physics and the state of art of the experimental measurements. | | |

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| **Applying knowledge and understanding on:** | Ability to autonomously recognize the main features of the phenomenology of heavy ion collisions and of QGP |
| **Soft skills** | • *Making informed judgments and choices*<br>○ In discussing and comparing the main heavy ion physics results and their interpretation in term of the quark-gluon plasma properties<br>• *Communicating knowledge and understanding*<br>○ ability to present and to discuss ultra-relativistic nucleus-nucleus collisions results in a complete way and with an appropriate scientific language.<br>• *Capacities to continue learning*<br>○ Ability to approach the specialist literature and to work in an international and multidisciplinary context. |

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| **Assessment and feedback** | |
| Methods of assessment | Oral colloquium |
| Evaluation criteria | • *Knowledge and understanding*<br>○ of the basic aspects of the ultra-relativistic nucleus-nucleus collisions.<br>• *Applying Knowledge and understanding*<br>○ Ability to autonomously recognize the main features of the evolution of the system created in a heavy-ion collisions<br>• *Autonomy of judgment*<br>○ Ability to evaluate the conceptual accuracy of the physics equations and models.<br>• *Communicating knowledge and understanding*<br>○ Ability to discuss one's knowledge with appropriate scientific language<br>• *Communication skills*<br>○ Ability to discuss the properties of the quark-gluon plasma using a professional language<br>• *Capacities to continue learning*<br>○ Ability to deepen specific topics of heavy ion physics autonomously starting from the knowledge and methods acquired during the course. |
| Criteria for assessment and attribution of the final mark | The ability to explain the various concepts and the level of understanding of the same will be positively evaluated |
| **Additional information** | |
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