TCM311 Quantum Field Theory I (2020-2023)

HUOM! OPINTOJAKSOJEN TIETOJEN TÄYTTÄMISTÄ KOORDINOIVAT KOULUTUSSUUNNITTELIJAT HANNA-MARI PEURALA JA TIINA HASARI

1. Course title

Kvanttikenttäteoria I
Kvantfältteori I
Quantum Field Theory I

2. Course code

TCM311

3. Course status: optional

-Which degree programme is responsible for the course?
Master's Programme in Theoretical and Computational Methods

-Which module does the course belong to?
TCM300 Theoretical and Computational Methods, Advanced Studies
PAP3002 Particle Physics and Cosmology, Advanced Studies

-Is the course available to students from other degree programmes?
Yes

4. Course level (first-, second-, third-cycle/EQF levels 6, 7 and 8)

Master's level, degree programmes in medicine, dentistry and veterinary medicine = secondcycle degree/EQF level 7
Doctoral level = third-cycle (doctoral) degree/EQF level 8

-Does the course belong to basic, intermediate or advanced studies (cf. Government Decree on University Degrees)?
Advanced studies

5. Recommended time/stage of studies for completion

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After Quantum Mechanics and Mathematical Methods in Physics have been completed.
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6. Term/teaching period when the course will be offered

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Spring term
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7. Scope of the course in credits

10 cr

8. Teacher coordinating the course

Kimmo Tuominen

9. Course learning outcomes

Basic concepts and methods of quantum field theory. These include: quantisation of free scalar and fermion fields and development of perturbation theory for interacting theories; examples of scattering processes in quantum electrodynamics; analysis of radiative corrections, regularisation and renormalisation methods; path integral meth ods.

10. Course completion methods

The course is completed by weekly exercises which are solved partly in class and partly submitted for assessment. Class attendance is strongly encouraged and will contribute towards the grade. The details of grading are explained on the first lecture.

11. Prerequisites

Quantum Mechanics IIa and IIb are recommended; Mathematical Methods in Physics II.

12. Recommended optional studies