

|                |  |
|----------------|--|
| <b>Module:</b> | <b>Elective Advanced Lectures:<br/>Theoretical Physics</b> |
|----------------|--|

|                               |
|-------------------------------|
| <b>Module No.:</b> physics70c |
|-------------------------------|

|                |   |
|----------------|---|
| <b>Course:</b> |  <b>Effective Field Theory (T)</b> |
|----------------|---|

|                               |
|-------------------------------|
| <b>Course No.:</b> physics757 |
|-------------------------------|

| Category | Type                   | Language | Teaching hours | CP | Semester |
|----------|------------------------|----------|----------------|----|----------|
| Elective | Lecture with exercises | English  | 3+2            | 7  | WT/ST    |

**Requirements for Participation:****Preparation:**

Advanced quantum theory (physics606)

Quantum Field Theory (physics755)

**Form of Testing and Examination:**

Requirements for the examination (written): successful work with the exercises

**Length of Course:**

1 semester

**Aims of the Course:**

Understanding basic properties and construction of Effective Field Theories, ability to perform calculations in Effective Field Theories

**Contents of the Course:**

Scales in physical systems, naturalness

Effective Quantum Field Theories

Renormalization Group, Universality

Construction of Effective Field Theories

Applications: effective field theories for physics beyond the Standard Model, heavy quarks, chiral dynamics, low-energy nuclear physics, ultracold atoms

**Recommended Literature:**

S. Weinberg; The Quantum Theory of Fields (Cambridge University Press 1995)

J.F. Donoghue et al.; Dynamics of the Standard Model (Cambridge University Press 1994)

A.V. Manohar, M.B. Wise; Heavy Quark Physics (Cambridge University Press 2007)

P. Ramond, Journeys Beyond The Standard Model (Westview Press 2003)

D.B. Kaplan, Effective Field Theories (arXiv:nucl-th/9506035)

E. Braaten, H.-W. Hammer; Universality in Few-Body Systems with Large Scattering Length (Phys. Rep. 428 (2006) 259)