

## **SUPPLEMENT FOR RELATIVISTIC QUANTUM FIELDS AND PARTICLES**

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### **I. COURSE SUPPLEMENT MODULES**

#### **A. Topics**

Create 3 course supplement modules to accompany the Relativistic Quantum Fields and Particles course [PHYS4490] taught by N. Kidonakis. These modules will address the following topics.

1. Matrix manipulation in Wolfram Mathematica. Introduction to symbolic calculations with FeynCalc: notation and conventions, four vectors and tensors manipulation.
2. Dirac matrices and spinors manipulation.
3. Computation of amplitudes involving spinors and evaluation of color algebra.

#### **B. Features**

Each module will be given online and will address the application of the Mathematica package FeynCalc to perform specific symbolic computations that arise in quantum field theory calculations. Each module will include a brief lecture (30 min) and hands-on activities (1hr). Explanatory notes will be made available. Homework assignments will be given.

#### **C. Learning Objectives**

Upon completion of these modules, students will be able to

1. Familiarize with the use of Mathematica for solving QFT problems.
2. Translate QFT mathematical expressions in FeynCalc language.
3. Perform simple QFT calculations using FeynCalc.