



Following the success of the course that Paul Sorba gave 2 years ago, our new PhD students and post docs asked Paul to renew the experience. The *Group Theory and its Applications* course is to be delivered over about 10 sittings. The course will cover

- 1) Elements of group theory and their importance in particle physics
- 2) Lie groups and Lie algebras
- 3) Classification of semi-simple Lie algebras
- 4) Representations of simple Lie algebras
- 5) Applications: spectroscopy of elementary particles, gauge theory, grand unification models
- 6) Extensions: superalgebras (for supersymmetry); quantum groups (for integrable systems); exceptional algebras and infinite dimensional algebras (for string theory)

Note:

- The sections 1 to 4 constitute the mathematical basis. Applications to particle physics will be presented during these lectures. - Section 5 will be more or less detailed, depending how much time will be left. - Same thing for Section 6.

- Bibliography: first part ("Lie algebras") of the book "Dictionary on Lie algebras and superalgebras" by L.Frappat, A.Sciarrino and P.Sorba, Academic Press,2000