

MATHEMATICAL TOOLS

[Iñaki Garay]

Differential geometry. Differential manifolds. Curves, tangent vectors and tangent space. Tensor algebra. Tensor calculus: covariant derivative, Lie derivative, geodesics.

Lie groups. Introduction to group theory. 2.2. Lie groups. Lie algebras. Lie group representations.

Fiber bundles and Yang-Mills theory. Introduction to fiber bundles. Examples of fiber bundles: tangent bundles and principal bundles. Introduction to Yang-Mills theory. Application to Standard Model of particle Physics.

Functional analysis Measure theory and Lebesgue integral. Spaces of integrable functions. Banach and Hilbert spaces. Distributions and Fourier transform. Operators and spectral theory.