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  - 題目：An introduction to Feynman path integrals by time slicing approximation I, II
  - 日時：平成 21年 10月 5日（月）I–14:45-15:30, II–15:45-16:30

(DVI file)

Abstract : In 1948, R. P. Feynman expressed the fundamental solution of the Schrödinger equation in an integral form, now called a path integral. The path integral was a new integral taken on over all paths connecting two points in the configulation space. Feynman explained his new integral as a limit of finite dimensional integrals, which is now called the time slicing approximation. Moreover, Feynman considered path integrals as a functional with geeral integrand, and suggested a new analysis on a path space with the path integrals and the functional derivatives. However, in 1960, R.H. Cameron proved that the measure for the path integral does not exist in a mathematically rigorous sense. Therefore, using time slicing approximation, we give a fairly general class of functionals so that Feynman path integrals with smooth functional derivatives have a mathematically rigorous meaning. More precisely, for any functional belonging to our class, the time slicing approximation of Feynman path integral converges uniformly on compact subsets of the configuration space. Our class of functionals is closed under addition, multiplication, translation, real linear transformation and functional differentiation. Furthermore, the invariance under translation and orthogonal transformation, the interchange of the order with Riemann-Stieltjes integrals and limits, the integration by parts and the Taylor expansion formula with respect to functional differentiation, and the fundamental theorem of calculus hold in the path integrals.

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