1093-28-62 **Ekaterina S Nathanson*** (ekaterina-nathanson@uiowa.edu) and **Palle E Jorgensen** (palle-jorgensen@uiowa.edu). *Definition of the Feynman path integral as a functional using the Henstock integration technique.* Preliminary report.

One of the key elements of the Feynman's formulation of non-relativistic quantum mechanics is a so-called Feynman path integral. It plays an important role in the theory but appears not as a well-defined object, but rather as a postulate based on intuition coming from physics. This is why it has been drawing attention of many mathematicians since the first publication of Feynman's work in 1948. The papers of Gelfand, Cameron, and Nelson are among the first attempts to supply Feynman's theory with mathematical rigor. They were followed by many others, but unfortunately not satisfactory. In the presentation I will introduce a new approach to define the Feynman's path integral. It is based on the theory developed by P. Muldowney. Muldowney uses the Henstock integration technique and nonabsolute integrability of Fresnel integral to obtain a representation of the Feynman's path integral as a functional. We will show how the new approach fixes the main problems in earlier attempts and what role the nonabsolute integrability of Fresnel integrals plays in establishing mathematical rigor supporting Feynman's intuitive derivations. (Received July 25, 2013)