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P1.038 Recent T2K flux predictions with NA61/SHINE thin graphite target measurements

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The T2K neutrino beam predictions require precise knowledge of the hadron production in proton-carbon interactions at 31 GeV/c. Currently one of the largest errors in flux estimates comes from the poor constraints of particle yields off the target. The NA61/SHINE experiment addresses this source of uncertainty for T2K with hadron production data collected from 2007 and 2009 taken with a thin graphite target of 2 cm length (about 0.04 of an interaction length λ_I). Measurements of π^\pm and K^\pm yields from the 2007 dataset were already used by the T2K experiment to tune neutrino beam simulations and reduce uncertainties. New results on π^\pm , K^\pm , p, K_S^0 and Λ production from the NA61/SHINE 2009 data analyses with smaller statistical and systematic errors are presented. They allow for further reduction of neutrino and antineutrino flux uncertainties in T2K. We introduce the method developed to tune T2K flux with NA61 thin target measurements and we discuss the total T2K beam uncertainty for neutrino and antineutrino mode with detailed decomposition of sources of errors that affect the flux predictions.