

# Recent results from NA61/SHINE at the CERN SPS

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## Collaboration

NA61/SHINE

## Abstract content

The main part of this contribution is devoted to looking at the NA61/SHINE experiment [1] through the prism of the needs of neutrino oscillation experiments. An overview is shown of the results on hadron production measurements from  $p + C$  interactions at 31 GeV/c registered during 2007. In addition, the new preliminary results from 2009 data are presented. These results are crucial for the precise determination of background contamination in the neutrino flux of the Tokai to Kamioka (T2K) experiment at J-PARC [2]. The presented results, i.e. inclusive production cross-sections for charged pions, kaons, and protons, are used in the T2K beam simulation program to reweight hadron yields obtained from models. Knowledge of neutral kaon production is also required for the accurate calculation of the  $\nu_e$  and  $\bar{\nu}_e$  fluxes from  $K_L^0 \rightarrow \pi e \nu_e$  decays. Therefore this contribution also discusses the analysis of the  $K_S^0$  and  $\Lambda$  particles. New results on production cross-sections of strange particles  $K_S^0$ ,  $\Lambda$ , and  $K^+$  are shown as well as the relative multiplicities of these particles. All measured spectra are compared to the predictions of hadron production models – Venus, UrQMD. Beyond the neutrino program a brief overview is given of the other main physics goals, inter alia the efforts to discover the critical point of strongly interacting matter and to study properties of the onset of deconfinement. These aims will be pursued by measurements of hadron production properties in nucleus-nucleus, proton-proton, and proton-nucleus interactions. Preliminary results from proton-proton interactions at 20, 31, 40, 80, and 158 GeV/c will be shown and compared to the corresponding data on central Pb+Pb collisions from NA49 [3].

[1] N.Antoniou et al. [NA61/SHINE Collaboration], CERN SPSC-2007-019, (2007). [2] K. Abe et al. [T2K Collaboration], Nucl.Instrum.Meth. A659, (2011), 106-135, e-Print: arXiv:1106.1238 [physics.ins-det]. [3] S. Afanasev et al. [NA49 Collaboration], Nucl. Instrum. Meth. A 430, 210 (1999).

**Primary author(s) :** PALCZEWSKI, Tomasz (University of Alabama)

**Presenter(s) :** PALCZEWSKI, Tomasz (University of Alabama)

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