

## NUCLEAR AND SUB NUCLEAR PHYSICS

### **Secondary charged particles and nuclear fragments in collisions of high energy atomic Nuclei.**

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consultant: RNDr. Martin Vaľa, PhD., prof. RNDr. Stanislav Vokál, DrSc.

study form: full time

Annotation: Study of the secondary charged particles production and nuclear fragments, their yields, multiplicities, correlations and angular spectra obtained by the same standard emulsion method using different primary nuclei ( $A=1-208$ ), energies ( $E=1-200$  GeV) and impact parameters of colliding nuclei – analysis of experimental data samples of EMU01/CERN and Dubna emulsion collaborations. The comparison with proton-nucleus interactions. Search for fluctuations of particles production using the scaled factorial moments method, and other methods. Model calculations using modified FRITIOF and Dubna cascade models, or other theoretical approaches. Comparison of the experimental results with theoretical predictions.

### **Study of angular substructures of particles produced in heavy ion collisions.**

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study form: full time

Annotation: An important aim of nucleus collisions investigation at high energies is to search for a phenomena connecting with large densities obtained in such collisions. As an example, the transition from the QGP (quark - gluon plasma) back to the normal hadronic phase is predicted to contribute to fluctuations in the number of produced particles in local regions of phase space. Using unique emulsion method collisions of  $^{16}\text{O}$ ,  $^{22}\text{Ne}$ ,  $^{28}\text{Si}$ ,  $^{32}\text{S}$ ,  $^{84}\text{Kr}$ ,  $^{197}\text{Au}$  a  $^{208}\text{Pb}$  nuclei with  $^{108}\text{Ag}$ ( $^{80}\text{Br}$ ) at momenta between 1 AGeV/c and 160 AGeV/c will be analyzed. The methods of transverse momenta, principal vectors, azimuthal correlation functions and the Fourier expansion of the azimuthal angle distributions and other methods will be applied. Comparison of experimental results with model calculations.

## **Institute of Experimental Physics SAS, Košice**

### **Study of a strangeness production in collisions of high-energy ions in ALICE experiment at LHC.**

supervisor: RNDr. Peter Kaliňák, PhD. (kalinak@saske.sk)

study form: full time

Annotation: The study is focusing on measurement of transverse momenta spectra and yields of the strange particles in particular classes of the multiplicity (centrality) of the collision. The method includes the identification of strange particles based on the topology of the decay. Using the reconstructed trajectories of the charged particles traveling through the ALICE detector, the candidates – the couples of trajectories which pass the selection criteria are used to compute the distributions of invariant masses. The signal is extracted from under the peak area of this distribution. In order to acquire final yields and spectra of the strange particles it is necessary to know the acceptance of the detector, efficiency of the reconstruction and to understand how the detector affects the measurement. Then it is necessary to perform the corrections for each effect and to perform the extrapolation to the areas where the measurement isn't possible. Some of the corrections are possible to acquire by using Monte Carlo simulations. The final results carry systematical errors, which needs to be studied and understood.