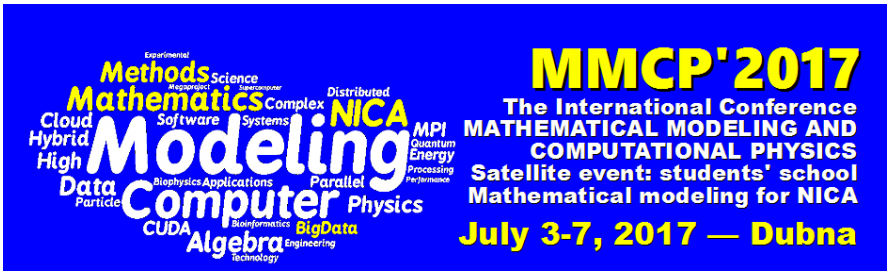

Contribution ID: **26** Type: **not specified**

An attempt to build a smart real-time system for heavy element research: approaches, mathematical objects, algorithms, equations.

Friday, July 7, 2017 9:30 AM (30 minutes)

The Dubna Gas-Filled Recoil Separator is the most advanced facility currently in use in the field of research of Superheavy Nuclei (SHN) [1]. During last year's, IUPAC established the priority of the DGFRS experiments in the discovery of new Z=114-118 elements. Definitely, the DGFRS detection system and method of "active correlations"have played a significant role in these discoveries [2-4]. Author defines abstract mathematical objects, like correlation graph and incoming event matrixes of a different nature in order to construct a simple procedure of detecting rare events, yet more exhaustive compared to the present one, using real-time detection mode. In this case one can use any of n·(n+1)/2 correlation graph edges to "trigger"beam irradiation pauses and thus provide "background free"conditions to search for ultra-rare alpha decays. Here n is the number of correlation graph nodes. Schematics of these algorithms are considered. Elapsed time value is used as matrix element for each event type. In the case of DSSSD detector-based system those matrices have dimension (X,Y), where X , Y are the numbers of horizontal and vertical strips, respectively. Proposals for test experiments with heavy-ion-induced reactions that can be used to check these approaches are considered. Some attention is paid to the forthcoming launch of a new FLNR ultra intense heavy ion DC-280 cyclotron for heavy element research. A role of a new protection and parameter monitoring system is discussed in a brief. Method to use more flexible correlation time intervals, using e.g. either V.B. Zlokazov's BSC (Background Signal Combinations) or K._H. Schmidt's LDSC (Linked Decay Signal Combinations) approach [5-7], except for fixed time intervals, is reported. In the last case, condition for the beam stop can be considered in the form of equation:$P_{corr}(t,\nu) < \varepsilon$, where PCORR is random probability value for a given correlation chain (i) measured in a real-time mode at the moment t, ν is mean rate parameter for a given DSSSD pixel, and ε is a preset small positive value. Of course, in this case one should additionally define one extra matrix related to event rate for each pixel of DSSSD. Some attention is paid to an analytical expression for SHE recoil registered with the DGFRS detection system.

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Short biography note

Since 1980 - staff researcher of FLNR, JINR. Branch of interest : synthesis of SHE, silicon and gaseous detectors, rare event real-time detection mode, EVR spectra modelling.

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Session Classification: Plenary