In the translead region $^{216}$Fr is known as the lightest isotope to have a band structure with interleaved states of alternating parities connected by enhanced B(E1) transitions [1]. Its bandhead is believed to be a $9^-$ isomeric state. While the existence of an alpha decaying isomers in odd-odd nuclei is common, a helium-jet based study performed by Sheline et al. [2] on the $^{224}$Pa $\rightarrow ^{220}$Ac $\rightarrow ^{216}$Fr $\rightarrow ^{212}$At alpha chain did not yield any information on the excitation energy of the postulated $9^-$ state nor on its half-life [2]. In this presentation we shall report on the attempts to search for the missing $9^-$ state in $^{216}$Fr with use of the Warsaw IGISOL system.

The $^{220}$Ac activity ($T_{1/2} = 26$ ms) was produced in the heavy-ion reaction $^{14}$N $+$ $^{209}$Bi, with target placed inside the helium gas cell of IGISOL system [3]. The cell with a volume of 400 cm$^3$, for which the gas flow simulations were performed using FLUENT code [4], was off-line tested with an alpha-decay recoil source $^{223}$Ra [5]. In the on-line experiment an ion extraction efficiency of a gas catcher/ion guide system was optimized for the heavy-ion reaction product $^{213}$Rn ($T_{1/2} = 25$ ms) and the maximum efficiency of about 3% was determined. For the physics experiment four silicon alpha detectors were placed at the collection point of the IGISOL magnet. The digital electronics (DGF) was tested in the $\alpha$-$\alpha$-$t$ correlations and pile-up modes with the $^{223}$Ra alpha source and the heavy-ion reaction product $^{220}$Ac (low spin alpha decay chain, see Fig. 1), respectively.

Details of the gas flow simulations, off-line and on-line tests of a gas catcher/ion guide system, digital electronics tests and the preliminary results of the physics experiment will be reported.

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**Figure 1:** Time-correlated alpha spectrum obtained for $^{220}$Ac setting. Events collected within 1 s after registration of the 9004 keV alpha line from $^{216}$Fr $\rightarrow ^{212}$At decay.