Referee report on the project PAS

Positron annihilation spectroscopy is a well-established method of studying the density and momentum distribution of electrons in condensed matter, its most important application being to obtain information on voids and defects in solids. The proposal PAS aims at constructing and commissioning the positron transport channel and the experimental station at the variable-energy positron source of the LEPTA facility and applying it to positron lifetime studies as well as at optimizing the positron accumulation in the positron trap to achieve an intensity of 10^7 positrons per cycle in the period of 2018–2020.

The proposal starts with a description of the studied problems and research objectives. In contrast to previous project proposals of group, the science case of the present proposal is really exemplary; it very clearly shows how the methodological and research objectives fit into the landscape of positron annihilation spectroscopy and its applications worldwide.

The main scientific merit of the proposal is developing one of the few variable-energy slow positron facility of the world that will allow to routinely perform cutting-edge depth-selective studies in the range of a few hundred nm and even below, first of all on voids and other lattice defects in solids but, in principle, also for studying other aspects of the electron momentum distribution on the surface of condensed-matter systems. The PMS trap with an intensity of 10^7 positrons per cycle will open the possibility, admittedly beyond the timescale of the present proposal, to construct a pulsed source that can be used for high-performance non-coincidence positron lifetime experiments. These are intellectual contributions that will surely turn the facility one of those research infrastructures of JINR which will be, at a later stage, suitable for hosting an international open-access user programme, a key feature of further integrating the JINR facilities in the European and global research infrastructure landscape.

The objectives of the project have been formulated in a rather conservative way; the results expected within the period 2018–2020 seem to be absolutely realistic, technically feasible and can be definitely realized within the envisaged timescale. I would not be too much surprized if, by the end of the project, even more progress turned out to have been made towards the realization of the pulsed-source-based positron lifetime spectroscopy.

The financial resources as summarized in the forms include, as always, only the direct costs that seem to be appropriate for realizing the project. Personnel cost and overhead will be certainly secured by the participating institutes. As concerning human resources, it is difficult to judge without knowing the FTE assigned to each participant. Nevertheless, given the high number of participants and knowing the engagement of the main proposers, the necessary human resources seem to be secured.

In conclusion, the proposal PAS is recommended to be supported by the PAC.

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Dénes Lajos Nagy
Research Professor Emeritus
Wigner Research Centre for Physics
Hungarian Academy of Sciences