

**Aerogel IC3120 under high pressure, obtained by pistons and nitrogen molecules**

Marek Gorgol<sup>1,\*</sup>, Bożena Zgardzińska<sup>1</sup>

<sup>1</sup> *Maria Curie-Skłodowska University, Institute of Physics, Department of Nuclear Methods,  
Pl. M. Curie-Skłodowskiej 1, 20-031 Lublin, Poland*

\*email: [marek.gorgol@poczta.umcs.lublin.pl](mailto:marek.gorgol@poczta.umcs.lublin.pl)

Highly porous IC3120 silica aerogel was subjected to the high pressure up to 450 MPa, while the positron annihilation lifetime spectra were collected. The pressure was delivered to the investigated samples in two ways: by pistons and by gas (nitrogen) penetrating the aerogel. The evolution of all PALS parameters is discussed. With the increase of the pressure, shortening of orthopositronium lifetimes (different, depending on the pressure introducing method) is observed. Similarity between the dependence of the longest-lived o-Ps component's lifetime on the pressure, for the sample affected with nitrogen molecules and pure nitrogen was observed. It suggests, that the nitrogen fills the largest free volumes of aerogel. The pressure exerted on investigated aerogel mechanically, causes much smaller decrease of free volume available for positronium.

Comparison of PALS results with the electron microscopy images obtained after removing the pressure confirmed, that more intense and lasting changes were caused by affecting the aerogel with the pistons.