

# Combined Triple Coincidence Positron Lifetime and Coincidence Doppler Broadening Measurement Setup

Martin Petriska <sup>a)</sup>, Stanislav Sojak, Vladimír Kršjak, Jarmila Degmová  
and Vladimír Slugeň

*Institute of Nuclear and Physical Engineering, Faculty of Electrical Engineering and Information Technology,  
Slovak University of Technology, Ilkovičova 3, 81219 Bratislava, Slovakia*

<sup>a)</sup> *Corresponding author: martin.petriska@stuba.sk*

**Abstract.** A triple coincidence digital positron lifetime setup (PALS) was combined with a coincidence Doppler broadening system (CDBS) in our laboratory to handle both measurements at the same time with the same positron source. Similar commonly used setup AMOC - Age-Momentum Correlation needs time correlation between positron lifetime and positron momentum. The exact correlation from the same positron annihilation event is not possible with this setup. Two photons from positron annihilations and 1274keV photons are used in triple coincidence PALS, and another annihilation photons spread in a line perpendicular to this plane are used for CDBS. In the CDBS part, 1274keV photons are used for steady energy calibration of the spectra. Therefore, photons detected in CDBS and PALS parts are not from the same annihilation event. From a long-term stability view, the temperature, the positron source activity and the stability of the power source are correlated and can be used to determine their impact on both measurements.