

Investigation of the fermi surface of metals and carbon materials intercalated by metal atoms by doppler broadening positron annihilation spectroscopy under low-background conditions

Taer M.S.^{1,®}, Gangapshev A.M.^{1,2}, Khokonov A.Kh.² and Akhmatov Z.A.^{1,2}

¹ Kabardino-Balkarian State University, Chernyshevskogo Street 173, Nalchik, 360004, Russia

² Institute for Nuclear Research of the Russian Academy of Science, Prospekt 60-letiya Oktyabrya 7a, Moscow, 117312, Russia

® mavar2014@yandex.tu

The first results of experiments on Doppler broadening positron annihilation spectroscopy of metal and carbon materials, including graphite intercalated by potassium atoms, are discussed. Currently, positron annihilation spectroscopy methods are finding wider application for solving the problems of restoring the electronic structure of matter [1]. Earlier, in the NIKA BNO laboratory, we conducted an experiment to measure the gamma activity of the $\omega = 1454\text{keV}$ line of the $K - 40$ isotope after intercalation of pyrolytic graphite with potassium atoms [2]. We used the Doppler spectroscopy of annihilation peak to determine the radius of the Fermi surface of metals and carbon materials, including graphite intercalated by potassium atoms. Spectra of annihilation photons were obtained for samples of metals Ag , Cu , W , Au , Pb , as well as for polyethylene, pure and intercalated with potassium atoms, pyrolytic graphite.

[1] Grafutin V and Prokop'ev E P 2002 *Physics–Uspekhi* **45** 59–74

[2] Ahmatov Z A Gangapshev A M R V S K A K and V K V 2018 *Phys. of Part. and Nucl* **49** 787–792