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Level structure of unbound heavy helium isotopes 7,9He

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The formation of the unbound heavy helium isotopes 7,9He was studied in the reactions of stopped pion absorption by light nuclei. The ground and excited states were observed in the following channels: 9Be(pion-,d)7He, 11B(pion-,pt)7He, 10B(pion-,pd)7He, 11B(pion-,pt)7He, 10B(pion-,dd)7He, 12C(pion-,p4He)7He, 12C(pion-,d3He)7He, 14C(pion-,t4He)7He and 11B(pion-,pp)9He, 14C(pion-,p4He)9He, 14C(pion-,d3He)9He. Measurements were carried out using two-arm multilayer semiconductor spectrometer. The data on the level structures obtained in different reaction channels are consistent with each other. Comparison with theoretical and experimental results obtained by other authors was performed. Our results on the energies and widths of the low-lying states of the 7,9He are consistent with the world data. Record values of resonance energies were obtained for highly excited states of 7He (24.5 MeV) and 9He (10.5 MeV).

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