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Ion-size effects in HTS cuprates - superfluid density and energy gaps BENJAMIN MALLETT, MacDiarmid Institute, Victoria University of Wellington, CHRISTIAN BERNHARD, University of Fribourg, THOMAS WOLF, Karlsruhe Institute of Technology, EDI GILIOLI, Istituto dei Materiali per l' Elettronica ed il Magnetismo (IMEM), JEFF TALLON, MacDiarmid Institute, Industrial Research Limited — The demonstrated central role that ion size plays in determining T_c in the HTS cuprates needs to be further explored in order to determine whether the demonstrated systematic behaviour plays out in other superconducting properties. After all, T_c can be diminished simply by disorder effects. What is the effect of systematic ion-size variation on the superfluid density and superconducting energy gap? And can these effects be used to infer details concerning the pairing mechanism? To address these issues we report the effect of changing ion size on muon spin relaxation measurements of the superfluid density and Raman measurements of the superconducting gap in the model system $RA_2Cu_3O_y$ (where R = La,..., Lu and A=$Ba_{2-x}Sr_x$). The electronic density of states is determined from the effect of Zn substitution in this system and we are able to discount disorder scattering as the source of the systematic changes in superconducting properties. Our results confirm a picture where the polarizability of the charge-reservoir layer plays a key role in setting the energy scale for pairing in this system.

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