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Low-lying dipole strength in exotic Ni isotopes

D. Rossi[1,2], P. Adrich[1], F. Aksouh[1], H. Alvarez-Pol[3], T. Aumann[1,4], J. Benlliure[3], M. Böhmer[5], K. Boretzky[1], E. Casarejos[6], M. Chartier[7], A. Chatillon[1], D. Cortina-Gil[3], U. Datta Pramanik[8], H. Emling[1], O. Ershova[9], B. Fernandez-Dominguez[3,7], H. Geissel[1], M. Gorska[1], M. Heil[1], H. Johansson[1,10], A. Junghans[11], O. Kiselev[1,2], A. Klimkiewicz[1,12], J. V. Kratz[2], N. Kurz[1], M. Labiche[13], T. Le Bleis[1,9,14], R. Lemmon[15], Yu. A. Litvinov[1], K. Mahata[1,16], P. Maierbeck[5], A. Movsesyan[4], T. Nilsson[10], C. Nociforo[1], R. Palit[17], S. Paschalis[4,7], R. Plag[1,9], R. Reifarth[1,9], H. Simon[1], K. Sümmerer[1], A. Wagner[11], W. Walus[12], H. Weick[1] and M. Winkler[1], for the R^{3}B collaboration

[1] *GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany*
[2] *Johannes Gutenberg-Universität, Mainz, Germany*
[3] *University of Santiago de Compostela, Santiago de Compostela, Spain*
[4] *Technische Universität Darmstadt, Darmstadt, Germany*
[5] *Technische Universität München, Garching, Germany*
[6] *University of Vigo, Vigo, Spain*
[7] *University of Liverpool, Liverpool, United Kingdom*
[8] *SINP, Kolkata, India*
[9] *Goethe Universität, Frankfurt am Main, Germany*
[10] *Chalmers University of Technology, Göteborg, Sweden*
[11] *Helmholtz-Zentrum Dresden-Rossendorf e.V., Dresden, Germany*
[12] *Jagiellonian University, Krakow, Poland*
[13] *University of the West of Scotland, Paisley, United Kingdom*
[14] *IPHC, Strasbourg, France*
[15] *STFC Daresbury Laboratory, Daresbury, United Kingdom*
[16] *BARC, Mumbai, India*
[17] *TIFR, Mumbai, India*

Contact email: *d.rossi@gsi.de*

The Pygmy Dipole Resonance (PDR) is a mode of nuclear excitation appearing at large neutron-to-proton imbalances in medium to heavy mass nuclei. Since the existence of this low-lying dipole mode is related to the neutron-proton asymmetry, the systematic investigation of the PDR can for instance contribute to the understanding of the symmetry energy in the equation-of-state of nuclear matter. This has an impact on the behavior of not only exotic nuclei, but also of objects of astrophysical interest, such as neutron stars.

Several experiments have been carried out in the past years using the R^{3}B-LAND setup at GSI in Darmstadt, in which the electric dipole strength of exotic nuclei has been studied. The experimental method was based on heavy-ion-induced electromagnetic excitation and the subsequent particle and photon decay. The measured E1 strength distribution of ^{68}Ni will be presented for the neutron-decay channels - with a special emphasis on the energy range in which the PDR is expected - and will be compared to other experimental data obtained by virtual photon scattering. The experimental dipole polarizability has also been extracted and is compared to recent theoretical calculations, allowing conclusions to be drawn on the neutron-skin thickness of ^{68}Ni and ^{208}Pb, and thus on the symmetry-energy parameters of the nuclear equation-of-state. Additional preliminary results on the E1 strength in other neutron-rich nickel isotopes will be also presented, revealing the presence of low-lying strength.