Investigating energy dissipation through nucleon transfer reactions

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Nucleon and cluster transfer probabilities have been measured in the systems ^{16,18}O,^{19}F + ^{208,204}Pb, ^{209}Bi for proton stripping channels down to ΔZ = - 2. Strong pairing correlations have been observed, with visible enhancements of 2p and 2n transfer probabilities relative to expectations of an independent particle transfer picture in particular channels. New measurements were made using an improved ΔE-E telescope developed from a previous design, which support previous observations from the ANU. The back-scattered projectile-like fragments were measured in the telescope at $\theta_{lab} = 160.6°$, and in combination with monitor detectors at forward angles allowed determination of absolute transfer probabilities. Previous measurements[1] of 2p transfer channels in ^{16}O + ^{208}Pb, in which 2p stripping was seen to be more probable than α stripping, have been confirmed in the current analysis. The improved design allows better mass resolution, with different isotopic yields now measurable to greater precision. An analysis of neutron transfer channels has shown that 2n stripping in ^{18}O + ^{208}Pb at energies below the Coulomb barrier, whilst negligible in ^{16}O + ^{208}Pb, is significant, being comparable to that of 1n stripping. A Q-value analysis of the reaction products again indicates the population of highly excited states in the residual target- and projectile-like fragments, in agreement with previous observations[1].

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