金属ナノワイヤにおける分散力の非加算性

Non-additivity in metallic tri-wire binding

前園涼

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We have investigated the non-additive contribution to the binding energy of three metallic wires modeled by 1-D homogeneous electron gases. The three-wire contribution is evaluated in the equilateral triangle geometry by subtracting the bi-wire interaction energies from the total energy of the tri-wire configuration. The three-wire contribution scales according to the power law $\delta E \sim d^{-\alpha}$ (d being the wire separation) with exponents $\alpha(r_s)$ being smaller than 3 and slightly increasing with r_s from 2.46 at $r_s = 1$ to 2.91 at $r_s = 10$, where r_s is the density parameter of the 1-D electron gases. We find that the contribution falls off quite slowly, implying it could be physically important.
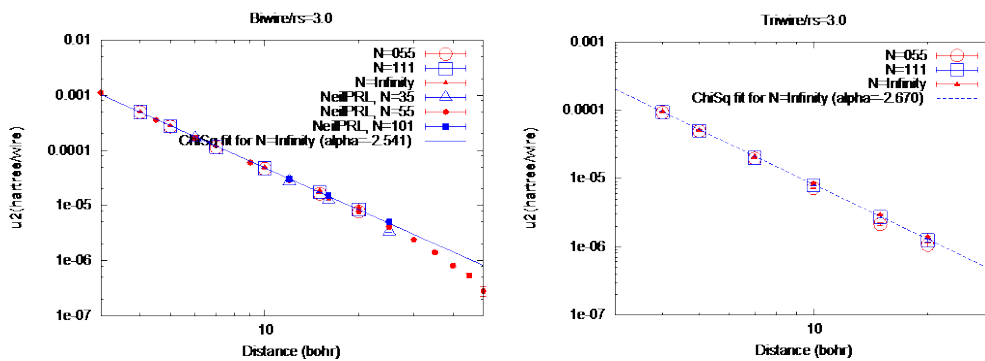

Figure. : Asymptotic behavior of the bi-wire interactions u_2 (left panel) and the non-additive contribution u_3 (right panel) at r_s=3.0