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**How ideal are the ideal-like polymers** DAVID SHIRVANYANTS, University of North Carolina at Chapel Hill, SERGEY PANYUKOV, P. N. Lebedev Physics Institute, Russian Academy of Sciences, MICHAEL RUBINSTEIN, University of North Carolina at Chapel Hill — The previously unknown long range correlations in the conformations of linear polymers in a  $\theta$ -solvent were found using analytical calculations and molecular dynamics simulations. Long range power law decay of the bond vector correlation function  $\langle \cos \phi \rangle \sim s^{-3/2}$  dominate the standard exponential decay  $\langle \cos \phi \rangle = e^{-s/l_p}$ , where  $\phi$  is the angle between the two bonds,  $s$  is their separation along the chain and  $l_p$  is the persistence length. These long-range correlations lead to significant deviations of polymer size from ideal with mean square end-to-end distance  $\langle R^2 \rangle - b^2 N \sim \sqrt{N}$ , where  $N$  is the number of Kuhn segments of size  $b$ . This new phenomena is explained by a fine interplay of polymer connectivity and the non-zero range of monomer interactions. Moreover, it is not specific for dilute  $\theta$ -solutions and exists in semidilute solutions and melts of polymers. Our results show good agreement with the experimental data on Flory characteristic ratio.

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