

SFKM2011

Conference Topics

Conference presentations are solicited from a broad range of research topics within the condensed matter physics, including the following:

- 1. Semiconductor physics (Theory of electronic structure, Quantum dots and wires, Photonic crystals, High magnetic fields phenomena, Ultra-fast phenomena)**
- 2. Surface, interface and low-dimensional physics (Graphene, Carbon and other nanotubes, Complex oxide interfaces)**
- 3. Magnetism (Magnetic structures, Magnetic phase transitions, Magneto-electronics and spintronics, Magnetic nanoparticles)**
- 4. Superconductivity (Heavy fermions, Quantum critical phenomena, Pairing mechanisms, High T_c superconductivity)**
- 5. Strongly correlated systems (New materials with strong correlations, Dynamical properties from time-resolved experiments, Quantum fluids and condensed matter with cold atoms)**
- 6. Phase transitions, ferroelectricity, multiferroics**
- 7. Polymer physics, soft matter, complex systems**

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Semiflexible Polymer Chains on Plane-filling Fractals

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Abstract. The lattice semiflexible self-avoiding walk model is used in polymer physics in order to describe relevant aspects of different phenomena, such as protein folding, adsorption of semiflexible homopolymers, transition between the disordered globule and the crystalline polymer phase, behavior of semiflexible polymers in confined spaces, or influence of an external force on polymer systems [1–5]. In spite of numerous studies, a scanty collection of exact results has been achieved so far, even for the simplest lattice models. Here we present the results of our recent exact renormalization group (RG) study [6] of semiflexible polymer chains on an infinite family of the plane-filling (PF) fractals. The fractals are compact, that is, their fractal dimension d_f is equal to 2 for all members of the fractal family enumerated by the odd integer b ($3 \leq b < \infty$). For various values of stiffness parameter s of the chain, on the PF fractals (for $3 \leq b \leq 9$) we calculate exactly the critical exponents ν (associated with the mean squared end-to-end distances of polymer chain) and γ (associated with the total number of different polymer chains). In addition, we calculate ν and γ through the Monte Carlo RG approach for b up to 201. Our results show that, for each particular b , critical exponents are stiffness dependent functions, in such a way that the stiffer polymer chains display enlarged values of ν , and diminished values of γ . On the other hand, for any specific s , the critical exponent ν monotonically decreases, whereas the critical exponent γ monotonically increases, with the scaling parameter b .

REFERENCES

1. Doniach, S., Garel, T., and Orland, H., *J. Chem. Phys.* **105** 1601-1608 (1996).
2. Mishra, P.K., Kumar, S., and Singh, Y., *Physica A* **323** 453-465 (2003).
3. Binder, K., Paul, W., Strauch, T., Rampf, F., Ivanov, V., and Luettmmer-Strathmann, J., *J. Phys.: Condens. Matter* **20** 494215 (2008).
4. Liu, Y., and Chakraborty, B., *Phys. Biol.* **5** 026004 (2008).
5. Lam, P.M., Zhen, Y., Zhou, H., and Zhou, J., *Phys. Rev. E* **79** 061127 (2009).
6. Živić, I., Elezović-Hadžić, S., and Milošević, S., *Phys. Rev. E* **80** 061131 (2009).