



ZAJEDNIČKI SEMINAR

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Quasicrystalline order in soft-matter systems

Over the past decade, quasicrystalline order has been observed in many soft-matter systems: in dendritic micelles, in star and tetra block terpolymer melts and in diblock copolymer and surfactant micelles. The formation of quasicrystal from such a broad range of 'soft' macromolecular micelles suggests that they assemble by a generic mechanism rather than being dependent on the specific chemistry of each system. Indeed, micellar softness has been postulated and shown to lead to quasicrystalline order. We theoretically explore this link by studying two-dimensional hard disks decorated with steplike square-shoulder repulsion that mimics, for example, the soft alkyl shell around the aromatic core in dendritic micelles. We find a family of quasicrystals with 10-, 12-, 18- and 24-fold bond orientational order which originate from mosaics of equilateral and isosceles triangles formed by particles arranged core-to-core and shoulder-to-shoulder. The pair interaction responsible for these phases highlights the role of local packing geometry in generating quasicrystallinity in soft matter, complementing the principles that lead to quasicrystal formation in hard tetrahedra. Based on simple interparticle potentials, quasicrystalline mosaics may well find use in diverse applications ranging from improved image reproduction to advanced photonics materials.

Primož Ziherl bavi se teorijskom fizikom meke tvari i teorijskom biofizikom. Izvanredni je profesor na Sveučilištu u Ljubljani, a radi i na Institutu Jožef Stefan. Objavio je pedesetak znanstvenih radova u međunarodnim časopisima koji su citirani preko 800 puta. Član je uredništva časopisa Physical Review E. Dobitnik je mnoštva nagrada, uključujući i „*Outstanding Referee*“ Američkog fizikalnog društva (2008. godine). Upravo je objavio rad „*Mosaic two-lengthscale quasicrystals*“ koji će biti okosnica njegovog predavanja.

[1] T. Dotera, T. Oshiro, and P. Ziherl, Nature 506, 208–211 (2014)

<http://www-f1.ijs.si/~ziherl/>