Tetrahedron Packing and Related Problems

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Since the proof of the Kepler conjecture, we have known the optimal packing density of equal-sized spherical particles, $\phi_{\max} = \frac{\pi}{\sqrt{18}}$. Unfortunately, this is the only non-tiling three-dimensional particle for which this much can be said. In many cases, we know much less than this. The regular tetrahedron has provided in recent times, in addition to exciting and surprising results, ample evidence of our ignorance about the optimal packing behavior of general particles.

There have been many results recently giving tighter and tighter lower bounds on $\phi_{\max}$ for regular tetrahedra, obtained by explicit construction of packings. The most recent by Chen *et al.* shows $\phi_{\max} \geq 0.8563....$ Rigorous results giving tight upper bounds on $\phi_{\max}$ have been more elusive. I will discuss the recent progress on both of these fronts with regards to the tetrahedron packing problem and with regards to related, more general problems.

For more information please visit the seminar website at:
http://www.math.nyu.edu/seminars/geometry_seminar.html.