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Ileana Streinu* (istreinu@smith.edu), Computer Science Department, Smith College,
Northampton, MA 01063. *Periodic rigidity of protein crystal structures.*

Recently, we initiated in silico rigidity-theoretical studies of protein crystal structures, with the goal to determine if, and how, the interactions among neighboring crystal cells affect the flexibility of the biological unit.

In this talk, I will discuss two recent directions, one mathematical and one biological, in which this research is proceeding. The mathematical theory of periodic rigidity, recently introduced by Borcea and Streinu [Proc. Royal Society A, 2010 and Bull. London Math. Soc. 2011] is directly applicable to such investigations. It provides both rigorous treatment and substantial algorithmic advantages over previous approaches. It also leads to further challenging mathematical questions, some of which will be briefly discussed. On the biological side, I will report on some recent work done with students Pamela Clark, Jessica Grant, Samantha Monastra and Filip Jagodzinski. Preliminary results, obtained using the rigidity analysis tools available through the KINARI-Web server <http://kinari.cs.umass.edu> developed in our group, indicate that important information, correlating rigidity parameters with protein function and overlooked until now, may be captured with this kind of analysis. (Received January 16, 2012)