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**ELISABETH WERNER**, Case Western Reserve University

*Floating bodies and Ulam's problem*

Ulam's problem from the Scottish Book asks: Is a solid of uniform density which floats in water in equilibrium in every position necessarily a sphere? This is an old problem going back to the 1930's and while there have been partial answers, in full generality the problem is still open. A natural object in this context is the floating body, which is this part of the solid that stays under water, regardless of the position of the solid. I will explain that the floating body is not only interesting for Ulam's problem, but actually relevant in many other contexts. So, for instance in affine differential geometry where it gives rise to an important affine invariant and, amazingly, even in data sampling: In high dimensions randomly distributed points concentrate (cluster) around a certain floating body.