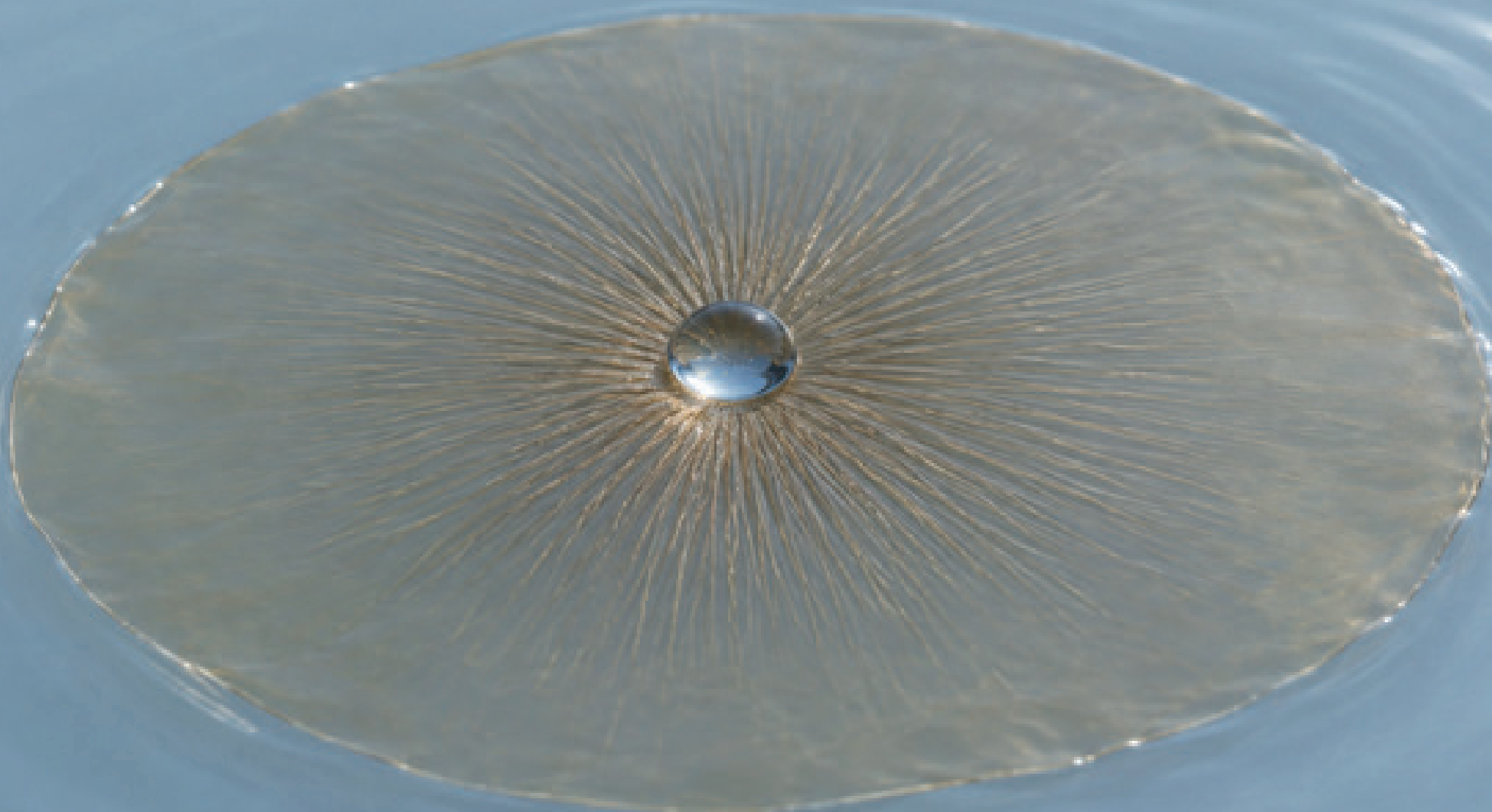




Ca' Foscari
University
of Venice

Department of
Molecular Sciences
and Nanosystems

Department
of Environmental
Sciences, Informatics
and Statistics

Roberta Marziani

Università degli studi di Trento

CAMPUS Math Talks

How Thin Sheets Wrinkle: Mechanics, Patterns, and Mathematics

15 ottobre 2026 11.00

Aula Delta 0B, Edificio Delta, Campus Scientifico

Organizzazione a cura di:
**Giulia Bevilacqua,
Nicola Ferro, Marta
Strani (DSMN)**

**Damiano Pasetto,
Gabriele Santin
(DAIS)**

Wrinkling patterns are pervasive in both natural systems and modern technologies, appearing in biological morphogenesis, plant leaves, skin, as well as in thin polymer films, suspended 2D materials, and flexible electronics. From a mechanical perspective, wrinkling stems from a subtle interplay between competing elastic mechanisms: thin sheets subjected to compression or inhomogeneous tension prefer to buckle out-of-plane rather than compress, forming complex multiscale patterns.

In this talk, we investigate wrinkling through the lens of the classical Lamé problem for a stretched elastic annulus within the Föppl-von Kármán framework.

Although the applied loads are purely radial, the radial displacement generates azimuthal compression in an inner region, forcing the material to accommodate an “excess arclength” by creating a cascade of wrinkles. Using a measure-theoretic convergence approach, we derive a rigorous effective functional that governs the asymptotic distribution of wrinkle frequencies as the sheet thickness vanishes. We will discuss the physical intuition behind this energy-driven pattern formation, bridging the gap between mathematical rigor, mechanical modeling, and cross-disciplinary applications in soft matter and materials science.