

STATISZTIKUS FIZIKA SZEMINÁRIUMOK

2019. 12. 04.

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ELTE TTK Északi Tömb 2.54

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Onsager's ideal turbulence: results in 2D

In 1949, Lars Onsager wrote the article entitled 'Statistical hydrodynamics' which appeared in *Nuovo Cimento*. This is the only published work of Onsager in the field of turbulence. However, his insights led him to groundbreaking contributions to turbulence theory in two and three spatial dimensions. In two dimensions, Onsager performed a Gibbsian analysis of the Helmholtz-Kirchoff model and discovered negative temperature states, which preceded the discovery of the same phenomena by Purcell and Pound in nuclear-spin systems in 1951. The qualitative results of the statistical analysis were able to explain the prevalence of large, steady vortices observed in two dimensional flows of high Reynolds number. In three dimensions, Onsager formulated a conjecture concerning regularity of incompressible solutions of Euler equations and the anomalous dissipation observed in ideal turbulent flows.

In these two seminars, we review the mathematical development of Onsager's ideas which culminated in the proof of Onsager's conjecture in 2017: weak solutions of the Euler equation of which Hölder exponent is greater than $1/3$ always conserve energy but there are dissipative weak solutions with Hölder exponent less than $1/3$. The proof involved the work of several mathematicians in the last decade of whom we mention László Székelyhidi Jr, Camillo de Lellis and Philip Isett.

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2.54-es szoba

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