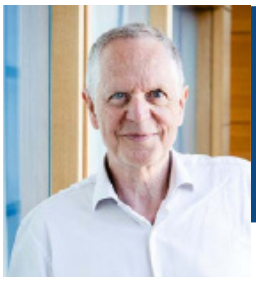
INTERNATIONAL SOLVAY INSTITUTES BRUSSELS

2021 Jacques Solvay International Chair in Physics

Inaugural Lecture - (FORUM D)



Professor Jean Dalibard

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A brief history of cold atoms

A laser beam can heat, burn, or even destroy ... but also allows to reach the lowest temperatures ever measured. The cooling of matter by light is undoubtedly one of the most paradoxical applications of the laser. It makes it possible to considerably reduce the disordered motion of particles in a gas and to achieve a near perfect order: the temperatures obtained are a billion times lower than the usual ones!

This inaugural lecture will present the general ideas at the basis of this unexpected use of laser light. It will also describe a few perspectives among the numerous research avenues opened by cold atoms. One emblematic example concerns the measurement of time: modern clocks, our "time keepers" which use atoms as pendulums, are all the more accurate when the atomic motion is reduced. The cooling of gases by light has thus allowed a spectacular improvement of the clock precision, which finds applications e.g. in navigation, positioning by satellite, or geodesy.

In this lecture, I will also explain why these assemblies of cold atoms constitute a "quantum matter" with fascinating properties, radically different from usual fluids. Then, the following lectures will be devoted to a more detailed investigation of some facets of this quantum matter, from the exploration of systems in reduced dimension to the notion of scale invariance and solitonic matter waves.

!!FORUM D - Tuesday 6 September 2022 at 4:00 P.M.

COFFEE AND TEA WILL BE SERVED AT 3:45 P.M. AND DRINKS AT 5:00 P.M IN FRONT OF THE FORUM A

The inaugural lecture will be followed by 3 lectures on

Tuesday 20 September at 2:00 P.M. (SOLVAY ROOM)

From Bose-Einstein condensation to Kosterlitz-Thouless physics

Friday 23 September at 2:00 P.M. (SOLVAY ROOM)

Controlling atomic interactions: Scale invariance tested in the laboratory

Friday 30 September at 2:00 P.M. (SOLVAY ROOM)

A droplet of spin-1 atoms: the simplest many-body system

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