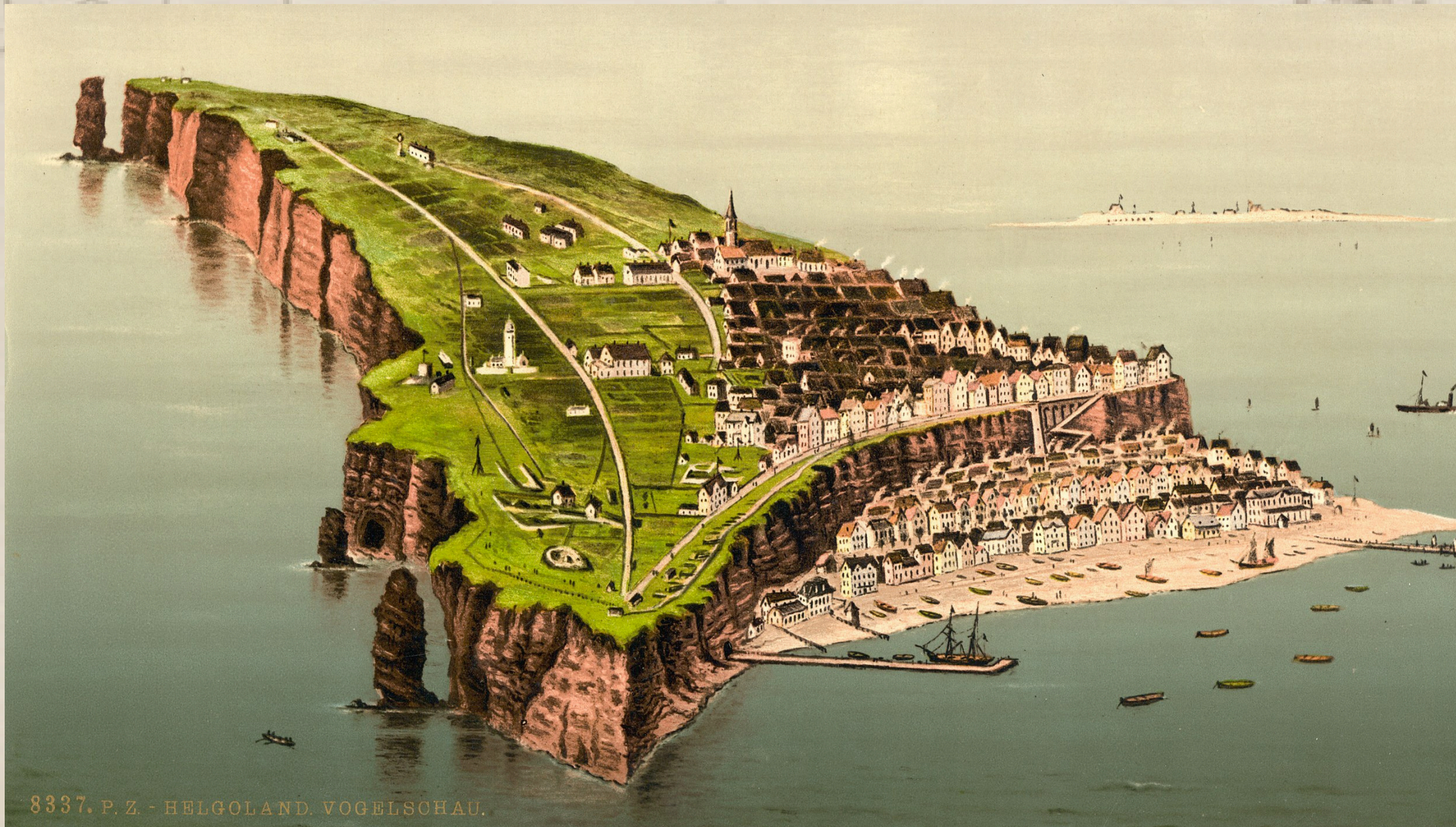




# DEPARTMENT OF PHYSICS INDIAN INSTITUTE OF TECHNOLOGY KANPUR

## 100 YEARS OF QUANTUM MECHANICS (1925-2025): WHAT HAPPENED IN 1925?



### ABSTRACT

The year 1925 saw the culmination of years of efforts to formulate a quantum theory that had a conceptual basis of its own, independent of classical ways of thinking. This was achieved by Heisenberg, who abandoned the classical picture of observing the position and momentum of a particle in a microscopic system, since it cannot be done. Instead, Heisenberg formulated the theory completely in terms of the frequencies and amplitudes corresponding to the light emitted from a system. This work is truly magical and is one of the finest demonstrations of the highest level of creativity combined with systematic and logical thinking. It is therefore a sheer delight to go through it and it is this exhilaration that I wish to share with the audience.

I begin with an introduction of the idea of the quantum by Planck in 1900 and its further development by Einstein in 1905. This is followed by how the idea started taking root through its application to the calculation of the specific heat of solids and to atomic sizes. I next present the major leap that came with the Bohr model of the hydrogen atom, which led many researchers to apply quantum ideas to different systems. This also included notable contributions by two Indians, both of whom started new fields with their work — which I will discuss. Nonetheless, the theory remained a hotchpotch of classical and quantum ideas and was therefore incomplete. This changed, as mentioned above, with Heisenberg's paper in 1925, and discussion about it will be the denouement of this talk.

I hope to take the audience through this remarkable journey from the first quantum steps to Heisenberg's 1925 leap — the moment when quantum mechanics truly came of age.



INTERNATIONAL YEAR OF  
Quantum Science  
and Technology  
**SPEAKER**



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