The Norwegian Academy of Science and Letters has decided to award the Kavli Prize in Astrophysics for 2018 to

Ewine van Dishoeck
Leiden University, NETHERLANDS

“*For her combined contributions to observational, theoretical, and laboratory astrochemistry, elucidating the life cycle of interstellar clouds and the formation of stars and planets.”*

We live in a universe where molecules are omnipresent and play a key role in the physical processes that lead to the formation of stars, planets, and life. Observing these molecules also allows astronomers to probe cold and obscured interstellar clouds in the Milky Way and other galaxies where these processes take place.

Our understanding of cosmic chemistry has been revolutionized by a combination of measurements with new observatories on the ground and in space, laboratory experiments, and theoretical studies of the relevant processes. Among the researchers who have contributed to this revolution, Ewine van Dishoeck stands out.

Among the many advances made by van Dishoeck and her collaborators are seminal contributions to our understanding of the formation and destruction of interstellar molecules. Their pioneering work on carbon monoxide has been essential for determining the physical processes that drive the evolution of the cold components of the interstellar medium, from diffuse to dense clouds in the Milky Way, as well as the cold star-forming gas in galaxies across cosmic time.

Through laboratory experiments, van Dishoeck’s group has advanced the quantitative understanding of the chemical processes governing the growth and evolution of interstellar ices. This work includes investigations of photoprocessing of ices composed of water, nitrogen, carbon monoxide and carbon dioxide. Such studies serve as the basis for modelling the effects of photo-desorption and processing of astrophysical ices, key steps in the evolution of molecular clouds and the subsequent formation of stars, protoplanetary disks, and planets. This work also helps to elucidate the chemical evolution of our Solar System, where comets and primitive meteoritic materials preserve the composition of the original cloud of gas and dust. Recently van Dishoeck and colleagues have extended this approach in an effort to connect the chemical composition of the comet visited by the Rosetta mission with that of young Solar-type stellar systems.

Ewine van Dishoeck has masterfully applied spectroscopic tools across a broad range of wavelengths with a superb exploitation of the most capable astronomical measurement techniques. She used the Infrared Space Observatory (ISO) to study molecules previously not accessible by microwave spectroscopy, the Herschel Space Observatory to follow the trail of water throughout star formation, and more recently the Atacama Large Millimeter and sub-millimeter Array (ALMA) to provide the first view of dust traps in disks around young stars, observationally constraining planet formation theories.

These examples illustrate the remarkable breadth of her approach to these fundamental problems, encompassing cutting-edge astronomical observations, physical and chemical theory, and laboratory experiments. Ewine van Dishoeck is leading the transformation of astrochemistry into a growing, quantitative discipline.