

3. Nobel Prize

Prelims: Science & Technology

Mains: GS-III- Science and Technology - Developments and their applications and effects in Everyday Life; Awareness in the fields of IT, Space, Computers, Robotics, Nano-Technology, Bio-Technology.

Why in News?

- ▶▶ The Nobel Foundation has recently started announcing the winners of “Nobel Prize” in various fields and winners and the concerned details are as follows:

Awardees in the field of Physics:

- ▶▶ The 2019 Nobel prize for Physics was awarded to Swiss Scientists Michel Mayor and Didier Queloz and Canadian – American physicist James Peebles.
- ▶▶ Peebles, who is awarded one half of the prize, is recognized specifically "for theoretical discoveries in physical cosmology.
- ▶▶ The other half of the prize is awarded jointly to Michel Mayor and Didier Queloz, "for the discovery of an exoplanet orbiting a solar-type star.

1. James Peebles discoveries

- ▶▶ The Canadian – American physicist James Peebles had contributed a lot to the field of physical cosmology for which he has been awarded with the prize. His discoveries are as:
 - ❖ He has made significant contributions towards **cosmic microwave background radiation**, Big Bang nucleosynthesis, dark energy and dark matter.
 - ❖ He was also the pioneer in the theory of Cosmic structure formation.

2. Contribution of Michel Mayor and Didier Queloz:

- ▶▶ In 1955, the Swiss astronomers discovered an exoplanet at an observatory in France. It was named orbiting a sun like star called 51 Pegasi b (or 51 Peg b). It orbits very close to the sun. The mass of the exoplanet is half of Jupiter and its temperature are around 1200 degree Celsius.
- ▶▶ At the time of its discovery by the astronomers this close distance for a planet to its start was not compatible with the theories of planet formation. Hence it led to discussions of planetary migration. Finally their discovery was proved right and it created revolution in astronomy.
- ▶▶ Today, exoplanets are being discovered very frequently — over 4,000 are known — which is remarkable progress from three decades ago, when not even one exoplanet was known.

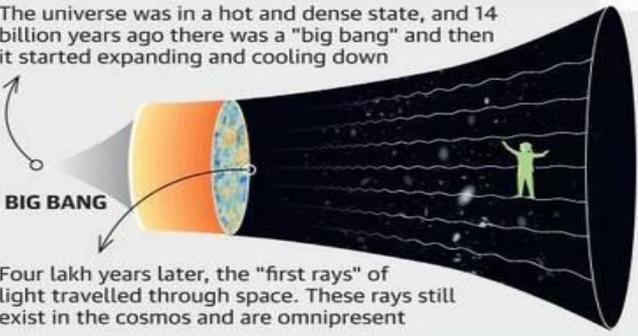
The unknown & an exoplanet

Canadian-American cosmologist James Peebles and Swiss scientists Michel Mayor and Didier Queloz won the 2019 Nobel Prize for Physics for revealing the wonder of the evolution of the universe and discovering exoplanets



James Peebles Michel Mayor Didier Queloz

The universe was in a hot and dense state, and 14 billion years ago there was a "big bang" and then it started expanding and cooling down



BIG BANG

Four lakh years later, the "first rays" of light travelled through space. These rays still exist in the cosmos and are omnipresent

- Peebles interpreted the "first rays" and showed that in the universe just 5% is known matter. The rest is unknown dark matter & dark energy. His insights turned cosmology from speculation to science sparking further research
- The dark matter is the force which holds together galaxies which otherwise may get torn apart. The dark energy helps the universe's increasingly rapid and constant expansion. Thus, one pulls and the other pushes
- Mayor and Queloz discovered "51 Pegasi b" — first-ever find of an exoplanet orbiting a solar-type star
- Surprisingly, the planet was as big as Jupiter (1,300 times Earth's volume) but was very close to its star (takes just 4 days to orbit)
- Big planets were thought to be created far from their stars. How did "51 Pegasi b" get so close? This question led to theories that described how large gas balls formed at the edges of their solar systems, then spiralled inward

Awardees in the field of Medicine:

- ▶▶ The 2019 Nobel Prize for Physiology or Medicine has been awarded to scientists William G Kaelin, Jr, Peter J Ratcliffe and Gregg L Semenza.
- ▶▶ They received the award jointly for their discoveries of "how cells sense and adapt to oxygen availability. they established the basis for our understanding of how oxygen levels affect cellular metabolism and physiological function.
- ▶▶ Their research has "paved the way for promising new strategies to fight anaemia, cancer and many other diseases.
- ▶▶ The three will share the Nobel prize sum of nine million Swedish kronor or about 9 Lakh 14 thousand US dollar. They will receive their prize from King Carl XVI Gustaf at a formal ceremony in Stockholm on December 10.
- ▶▶ It is the 110th prize in the category that has been awarded since 1901.

About Nobel Prize:

- ▶▶ Alfred Nobel, a Swedish chemist, engineer, industrialist, and the inventor of dynamite, in his last will and testament in 1895, gave the largest share of his fortune to a series of prizes which were collectively came to be known as the "Nobel Prizes".
- ▶▶ The awards are started from the year of 1901 for five different fields and in the year 1969, the field of Economic sciences was also included.
- ▶▶ The Nobel Prizes are widely regarded as the most prestigious awards given for intellectual achievement in the world.

▶▶ The various awards that forms the group of “Nobel Prizes” are as follows:

1. Nobel Prize for Physics
2. Nobel Prize for Chemistry
3. Nobel Prize for Physiology or Medicine
4. Nobel Prize for Literature
5. Nobel Prize for Peace.
6. Nobel prize for Economic Sciences (added only in the year 1969)

The Awards are presented by:

- ▶▶ The Royal Swedish Academy of Sciences confers the prizes for Physics, Chemistry, and Economics. (Sweden Based)
- ▶▶ The Karolinska Institute confers the prize for physiology or medicine. (Sweden Based)
- ▶▶ The Swedish Academy confers the prize for literature. (Sweden Based)
- ▶▶ The Norwegian Nobel Committee based in Oslo confers the prize for peace. **(Norway Based)**

Indians (or individuals of Indian origin) who won the award are:

- ▶▶ Rabindranath Tagore (Literature, 1913), C V Raman (Physics, 1930), Hargobind Khorana (Medicine, 1968), Mother Teresa (Peace, 1979), Subramanian Chandrashekar (Physics, 1983), the Dalai Lama (Peace, 1989), Amartya Sen (Economics, 1998), Venkatraman Ramakrishnan (2009), and Kailash Satyarthi (Peace, 2014).