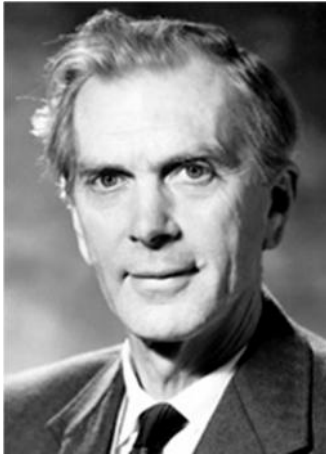
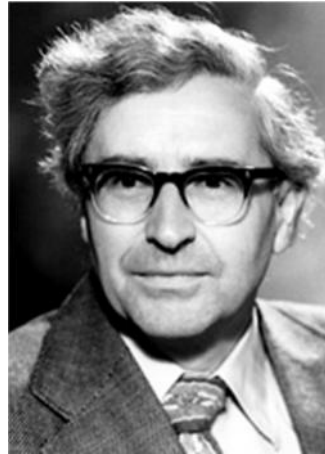


Nobel Prize in Physics 1974



Sir Martin Ryle



Antony Hewish

The Nobel Prize in Physics 1974 was awarded jointly to Sir Martin Ryle and Antony Hewish *"for their pioneering research in radio astrophysics: Ryle for his observations and inventions, in particular of the aperture synthesis technique, and Hewish for his decisive role in the discovery of pulsars"*

RESEARCH INFORMATION:

THE PHYSICS OF THE STARS

Astrophysics, the science dealing with the physical properties of the stars and the stellar systems, has developed rapidly during recent decades. This is mainly due to new discoveries made with radio astronomical methods. These methods are of vital importance when making observations over cosmic distances, thousands of millions of lightyears or more. It is essential that such distances can be covered when trying to chart the development of the universe. A light year is the distance that light travels in one year. Light moves at a speed of 300 pillion metres per second.

In contrast to visible light coming to us from the celestial sphere, radio emission from other space can only be perceived with the help of telescopes. Highly sensitive

electronic instruments amplify and handle the data-processing of the signals.
SEVERAL SMALL TELESCOPES "FORM" ONE LARGE TELESCOPE

During the last twenty-five years, Martin Ryle has developed new epochmaking telescope constructions and registration principles. With the help of these he has explored the radio sources of the universe and gradually achieved greater and greater accuracy in the determination of direction. Definition is now so good that in the case of visible light it corresponds to an observer on earth being able to see the details of a postage stamp on the moon, Ryle has developed a technique - the aperture synthesis technique - which means that with the help of a number of small telescopes, whose positions are mutually adjustable within a distance of nearly 5 kilometers he can achieve a precision equalling that obtainable by having the whole area covered by a single vast telescope, a construction which is technically not possible. Ryle also makes use here of the rotation of the earth to change telescopic positions in relation to the celestial sphere.

The wealth of detail in the charting of the universe carried out in recent years with this apparatus is absolutely unique. For a number of years Ryle has been making observations with his various instruments that have been of crucial significance in the study of the physical characteristics of stars and stellar systems and for cosmology, the study of the development of the universe as a whole.
THE PULSARS

In the summer of 1967 Antony Hewish started a series of observations which soon led to an extremely interesting and quite unforeseen discovery. Some radio sources in space, later given the name "pulsars", emitted radio signals - pulses - which were repeated extremely regularly at intervals of a second or so. As a result of this discovery it has been possible to establish the presence of so-called neutron stars in the universe, something that scientists have been speculating about ever since the Thirties. Neutron stars are bodies which are extremely heavy, in comparison to their size - about 10 kilometres in diameter. One cubic centimetre of neutron-star matter of which the pulsars consist, weighs millions of tons! The observed emission from a pulsar shows that they must have a magnetic field

which is extraordinarily strong many millions of times stronger than any magnetic field used in the laboratories on earth. Every signal from the pulsars corresponds to enormous quantities of energy. It is probable that the neutron star, which is the "nucleus" of a pulsar, surrounds itself with a plasma, a gas conducting electricity, and the whole system including the magnetic field rotates. The pulsar is then perceived from the earth as a radio beacon!

The best known pulsar is to be found in the Crab Nebula. This nebula consists of a glowing cloud of gas, the remains of a stellar explosion, which according to Chinese records took place in 1054 A.D. It is one of the most interesting phenomena in the heavens. It has been found that its centre, from which it expands, contains a pulsar emitting not only radio pulses but also light pulses and X-ray pulses.

The discovery of the pulsars is of paramount importance to physics and astrophysics. The pulsars play a vital role in the genesis of the elements and the chemical development of the galaxies. New avenues have been opened up for studying the properties of matter under very extreme conditions.

For more details please visit:

http://www.nobelprize.org/nobel_prizes/physics/laureates/1974/press.html