

ASTRONOMY

# Two New Super Heavy Stars Are First Finds at McDonald

## Great 82-Inch Telescope Discovers "White Dwarfs" So Dense a Handful of Their Substance Weighs Tons

**T**WO remarkable stars made of strange stuff a hundred thousand times heavier than water are the first major discoveries of the new McDonald Observatory 82-inch telescope. Even before this new giant instrument was formally handed over by its makers, Warner and Swasey Company, to the Universities of Texas and Chicago for their joint use, Prof. G. P. Kuiper was gathering with the great mirror upon extremely sensitive photographic film light from stars suspected of being relatively close to earth.

He was searching for heavy-weight "suns" that tax the human imagination, stars so dense that a handful of their substance weighs hundreds of tons, stars made of degenerate gaseous matter or atoms stripped to their hearts.

Two such mysterious "white dwarfs" new to astronomy were spotted by Prof. Kuiper. One of these is perhaps the most remarkable star ever discovered. It is the faintest such star ever found and it is so close to having no stellar atmosphere that there are absolutely no lines in its spectrum. This star, No. W489, is relatively cool and only such powerful telescope and fast photographic film as used would have detected it.

In six intensive weeks of observing with the 82-inch telescope, Prof. Kuiper captured 600 spectral photographs of 300 stars of large proper motions which showed them to be near us in the Milky Way. Discovery of two new white dwarfs among them is extremely good astronomical fishing.

Including the two new ones, only 18 white dwarfs are known to science. Prof. Kuiper has discovered half of these and he has reobserved all of them with the McDonald telescope since March 15.

Most famous of heavy-weight stars is the companion of Sirius, but the heaviest, discovered some years ago at Lick Observatory, is believed to have a density ten million times that of earthly water. This is less than half as dense as the absolute limit for solidness theoretically possible. When the atoms are knocked to pieces completely, without electrons and with only bare nuclei, this degenerate matter, still a gas, strange as it may

seem, would be a hundred thousand times a hundred thousand times a hundred thousand times (ten to the fifteenth power) the density of water.

Besides his strange white dwarfs, Prof. Kuiper has discovered another family of faint or under-luminous stars. These are about a third of the size of our sun, instead of being about the earth's size like the true white dwarfs. The sub-dwarfs are made of ordinary star gas instead of the degenerate superheavy matter.

### New Concept of Universe

**A** NEW kind of universe built out of mathematical logic instead of physical observation, yet capable of encompassing and explaining other suggested universe pictures painted by Newton, Einstein and other cosmologists, is offered to science by the British mathematical astronomer, Dr. E. A. Milne, of Oxford University, speaking on occasion of McDonald Observatory's dedication.

A sort of universe to end, or at least reconcile, all universes, the Milne cosmology has the appeal of being more philosophically and religiously satisfying. It does not call upon any irrational factors or mystical ideas to explain it.

Not only is the immense far-flung expanse of galaxies explained, but the Milne universe can be applied to the hearts of atoms, gravitation and electricity.

Although its need arises out of the American exploration of space with giant telescopes, resulting in the discovery of millions upon millions of giant galaxies of stars, Dr. Milne's universe-building discards as a basis the physical observations of the world about us. Instead of starting with what the telescopes show to be in the visible universe, Dr. Milne builds physics from the bottom up, renouncing outside facts, and starting only with the fundamental phenomenon of the passage of time.

By time-tried mathematical procedures, Dr. Milne derives from our individual awareness of the passage of time a system of agreeing time-keeping in different places in the universe. From these time relations come a kind of kinematics and dynamics that are used to give a logical meaning to what is called uniform time. This allows explanations of gravitation and electromagnetism as well as the observed facts about the physical universe.

In a sense, Dr. Milne has attempted to



ON A TEXAS MOUNTAIN TOP

World famous astronomers discussed the Milky Way galaxy in which we live and the known facts and theories about extragalactic space. These important meetings followed dedication of the new 82-inch reflector on Mt. Locke, in Texas' Davis Mountains.

do for physics and astronomy what the Greeks did when they took the isolated facts of Egyptian mathematics and combined them into a logical system. The bringing of the atomic world into the same set of rules that governs the rest of the universe is one of the unsolved problems of science. Einstein and others have also been attempting to bring gravitation and electrodynamics into one set of theories. If the Milne picture of cosmology succeeds in accomplishing these objectives, it will be a major achievement.

One major consequence of Dr. Milne's work is that the two conflicting conceptions of space and time, the Newtonian static universe and the expanding universe of Einstein's special relativity, can be reconciled and in fact shown to be variations of the real universe.

The universe based on Newtonian dynamics, which Dr. Milne calls "Tau time" because he uses that Greek letter to designate it in his equations, is stationary, homogeneous, infinite in extent and hyperbolic in space type. The expanding universe of special relativity in what is called T time has the nebulae or star systems rushing out with tremendous speeds, its matter is not evenly distributed, it has a finite limit to its maximum expansion. It is described as a "flat private space." Yet analysis by Dr. Milne shows that T time becomes Tau time when the universe is viewed from any particular location.

One consequence of the Milne formulations of space and time is that if a material solid rod of some sort could be made to join two great stellar galaxies rushing away from each other at tremendous speeds, it would not break because it would expand at the same rate as the expanding universe of which it would be a part.

## Starlight Dimmed by Clouds

**E**VEN the brightest parts of the Milky Way stretching across the night sky would be twice as bright were it not for light-absorbing clouds of interstellar matter that dim their starlight, Dr. Joel Stebbins, director of Washburn Observatory, Madison, Wis., told the astronomers.

These dark clouds of cosmic dust that capture night light lie close to the main plane of the Milky Way. They are so thick that light coming to earth takes about 325 years to pass through them. However, the last 650 years of light's journey from stars to earth is through clear space. Dr. Stebbins plans to continue his researches to determine wheth-

er the sun happens to be in a clear region of space.

Until a few years ago astronomers did not suspect that stars are dimmed by clouds of interstellar material. By using the electric eye as well as the human eye and photographic plates, color differences were traced to irregularly distributed absorbing clouds in our part of the universe.

## Galaxy Is Middle-Aged

**W**E LIVE on the outskirts of a middle-aged spiral universe of stars, which in the beginning was a great cloud of gas. As time goes on it will extend farther two spiral arms consisting of millions of stars, only to contract them again. This is the picture of our Milky Way presented by Dr. Bertil Lindblad, Stockholm Observatory, Sweden.

Look out at night upon the brightest

part of the Milky Way in the region of Sagittarius and you are looking toward the center of our galaxy. It is thirty thousand light years away, obscured by clouds of cosmic stuff. In the central system of our own spiral nebula, there are a hundred thousand million stars, but our sun is not so centrally located as these. Instead, the sun with its family of planets is revolving about the central portion of the spiral, making the circuit in two hundred million years.

From the form of the Milky Way, Dr. Lindblad concludes that it is no longer young, but on the other hand is not unduly aged. It is probably at an age corresponding to "life begins at forty" in a human being.

Looked at from the outside it would remind one of a pinwheel with two streams of starfire, but revolving oppositely from a fireworks pinwheel.

*Science News Letter, May 20, 1939*

### PSYCHOLOGY

# Wager and Publicity Best Aids to Cutting Out Smoking

## Best Way Is to Lose Desire, But That Is Not Likely; Lacking That, Make a Bet and Tell Everybody of It

**I**F YOU want to quit smoking, bet some friend a whopping big sum of money—a year's rent, say—that you are going to swear off smoking and then tell everyone you meet that you have sworn off. These two measures are recommended, as the surest and most practical way of breaking the tobacco habit, in a book by J. C. Furnas, *So You're Going to Stop Smoking* (Simon and Schuster).

The book also gives the low-down on why people smoke and what tobacco smoking does to the body.

A big bet and plenty of publicity enabled Mr. Furnas, himself a two-to-three-packs-a-day cigarette smoker, and his wife to stop smoking for six months, he reports. But his researches, which included sending questionnaires to many prominent persons after he discovered how interesting the subject was to himself and many others, produced many alternative methods which the smoker who wants to stop might try.

The best way, Mr. Furnas admits, is suddenly to lose the desire to smoke. George Ade did after an illness. John Spargo did without even an illness. Mr. Furnas dismisses this idea, however, as

"involuntary magic" unlikely to come to those who are worried over how to stop smoking.

The next best way Mr. Furnas advises is to have some physician "scare the lights out of you about smoking." That this does not always work is shown by the testimony of Rose Wilder Lane, who stopped smoking for 10 days on a doctor's order, then lighted a cigarette and went to another doctor because she was "convinced the first one was stupid."

Rationing the number of smokes per day and tapering off are "poison," Mr. Furnas declares. One "automatic" smoker reported he was helped by what Mr. Furnas terms the "soul searching method" of asking himself each time he started to light up whether or not he really wanted to smoke at that moment. But Mr. Furnas clearly thinks little of this method.

The "Mammon Method" is the surest, Mr. Furnas believes, "for the crude, crass and thoroughly reprehensible reason that no sane person would light a smoke costing enough to pay the rent for a year."

*Science News Letter, May 20, 1939*