



◊ * ◦ • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS

with one, it would soon float off into space!

The same thing is true of the planet Mercury. Also, Mercury is only a little more than a third as far from the sun as we are, and it is very hot. It is hot enough, on the part of Mercury which faces the sun, for lead to melt, so that planet hardly seems to be a suitable place of habitation.

Venus is almost as big as the earth, and the force of gravity is nearly as great as it is here. It has an atmosphere, but one that is continually laden with clouds, of which we see only the tops, and through which we cannot penetrate to see the surface of the planet. The temperature above these clouds is about ten degrees below zero Fahrenheit, but, of course, it may be much warmer below. However, spectroscopic studies have revealed no trace of water vapor or oxygen in this atmosphere, so the chances of life there seem rather slight.

Mars Farther Off

Mars this month is not nearly so close as it was last July, and that is why it is now so faint. Mars has an atmosphere, for sometimes clouds can be observed in them. But there also no water vapor or oxygen has been detected. However, there may be slight amounts, though too little to produce an effect that we can find. The white areas, which come and go around the poles of Mars, are probably polar caps of ice or snow, and these would put small amounts of moisture into the air. The green areas which appear in the Martian springtime, and vanish in the autumn and winter, behave like vegetation. There may be vegetable life on Mars, though it is hard to imagine animal life, and especially intelligent animals.

Jupiter and Saturn are both so far out from the sun that the temperatures there are very low. They have atmospheres, but of methane and ammonia, poison gases on earth. They could hardly be the abode of life, even if it could be acclimated to the extreme cold. Uranus and Neptune, telescopic planets, are believed to be similarly constituted, and even colder. Pluto, the present most distant known planet, is much smaller, probably no bigger than Mercury, so it is too small to have atmosphere, and in addition is colder even than Neptune. It seems, therefore, that the planet earth is the only one in the solar system which we are sure is inhabited by intelligent life—and sometimes we have reason to doubt even its intelligence.

Celestial Time Table for February

Monday, Feb. 5, 1:58 a. m., Algol at minimum brightness. **Wednesday, Feb. 7,** 10:47 p. m., Algol at minimum. **Thursday, Feb. 8,** 2:45 a. m., New Moon; 9:08 p. m., Moon passes Mercury. **Saturday, Feb. 10,** 7:36 p. m., Algol at minimum; 9:00 p. m., Moon farthest, 252,400 miles from earth. **Sunday, Feb. 11,** 4:11 p. m., Moon passes Venus. **Monday, Feb. 12,** 9:32 a. m., Moon passes Jupiter. **Tuesday, Feb. 13,** 3:00 a. m., Mars passes Saturn; 4:26 p. m., Algol at minimum; 9:55 p. m., Moon passes Saturn; 10:53 p. m., Moon passes Mars, about two lunar diameters to the south. **Thursday, Feb. 15,** 2:20 p. m., Moon passes Uranus. **Friday, Feb. 16,** 7:55 a. m., Moon at first quarter. **Tuesday, Feb. 20,** 5:00 p. m., Venus passes Jupiter, two lunar diameters to the north. **Friday, Feb. 23,** 4:55 a. m., Full moon; 5:00 p. m., Moon nearest, 221,900 miles from earth. **Saturday, Feb. 24,** 4:21 p. m., Moon passes Neptune. **Sunday, Feb. 25,** 3:43 a. m., Algol at minimum. **Tuesday, Feb. 27,** during evenings of next week remarkable planet display seen in west after sunset. **Wednesday, Feb. 28,** 6:00 a. m., Mercury farthest east of sun, seen as evening star about this date. **Thursday, Feb. 29,** 9:35 a. m., Moon in last quarter.

Eastern Standard Time throughout.

Science News Letter, January 27, 1940

PHYSICS

Neutral Meson Particle Needed to Explain Forces

A NEW kind of atomic particle that would make "triplets" out of the "twin" meson particles found in cosmic rays, is suggested by the man who worked out the theory of how the sun keeps shining, Prof. Hans A. Bethe, Cornell University physicist.

Prof. Bethe has been applying his skill in mathematical physics to calculations on how meson particles—having 200 times the mass of ordinary charges of electricity, the electrons—can be used to explain nuclear forces. These attractive forces within the nucleus help hold all atoms, and hence all matter, together and form a sort of "cement" that binds together the atomic building blocks of the physical world.

That meson particles might exist and have the role of transferring energy between nuclear particles was first suggested in 1935 by the young Japanese physicist Yukawa. This was before the particles were actually found in cosmic radiation.

For an atom to liberate a meson particle would require from 80,000,000 to 100,000,000 electron volts of energy, Prof. Bethe's calculations show. This is far beyond any energies yet available in the laboratory through bombardment by giant machines for smashing the atom.

The new triplet kind of meson, yet unfound but needed to explain more fully nuclear forces, would be without an electrical charge, says Prof. Bethe. Mesons with positive and negative electrical charges—the twins—are already known.

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