STARS AND ATOMS (Eddington)

The Interior of a Star.

1. Man's body nearly midway between atom and star as to mass: consists of 10^{27} atoms and star of 10^{28} human bodies. 9

2. Road to knowledge of stars through atom, and from stars much knowledge of atom reached. 10

3. Energy of motion of gas particles proportional to temperature;

4. Outer layers of star supported by impact of inner atoms.

5. Hence relatively simple to calculate temperature of interior of stars. 11-13

6. Temperature at surface of sun 6,000 degrees and at center about 40,000,000 degrees. 14

7. Temperature is but a way of measuring rapidity of motion of atoms or molecules. 14.

8. At average temp. velocity of molecules of gas 500 yds per sec. at 40,000,000 degrees vel. is over 100 miles per sec. 15

9. In addition to atoms ether waves are inside star. 15

10. These waves inside stars belong to division called X-rays. 16.

11. Also in stars there are free electrons. 16

12. Atoms in star have lost more or less of their rotating electrons. 16

13. Atoms ionized by incidence of X-rays. 19

14. Ionization also by collision of fast moving electrons. 19-20

15. Though electrons quickly captured in stars they are stripped away so fast as to leave atoms almost bare. 21

16. Atoms when stripped have all practically the same properties. 22

17. Matter becomes complecated at low temperatures as on earth. 22

18. Mass of sun 2×10^{27} tons. 24

19. Variation of more than 1/10th in either direction almost unheard of. 25

20. Pressure of radiation just about equals other forces in star at this mass. 25

21. Ation of radiation tends to make greater masses instable. 26

22. While atoms and electrons are held to star by gravity, the X-rays travel by devious course outward, where softened to light rays they speed through space. 27-8

23. Many stars gaseous. 31

24. Some stars more tenuous than our atmosphere. 31.

25. Energy of heat and light that leaks out of gaseous stars dependent on mass and but little affected by density. 32

26. Theory and observation as far as it has gone basicly agree in determining relation between mass and radiation. 33-34

27. Since we have knowledge of absolute brightness of some stars we are enabled to calculate their mass from above relation. 35

28. In the form of stellar matter gases may be denser than iron and still remain gases. 40

29. This is due to the stripped condition of the atoms. 40.

30. Agreement betwwen observed and calculated brightness of stars main test as to correctness of concepts as to internal constitution. 40.

~~31.~~ Some recent Investigations.

1. Work on companion of Sirius showed star of mass 60,000 times that of water. 50 et seq.

2. In the most empty portion of intersteller space there is about one atom per cubic inch. 65

3. Temperature of intersteller space for compact matter is 3 degrees absolute temp. but for individual atoms found there about 15000 degrees. 69

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