

Message of Modern Astronomy.

- I. Rapid survey of basic astronomic concepts up to and through the Newtonian era.
 - A. Copernican change.
 - B. Development of mechanical picture in absolute space and time.
 - C. Old view of nebular hypothesis.
 - D. Contraction hypothesis of Lord Kelvin.
- II. Sketch of present astronomical picture.
 - A. The group of astronomical objects.
 - 1. Planets, satellites, comets, meteors, asteroids, stars and nebula.
 - 2. Planetary system no longer an object of primary astronomical interest but the stars.
 - B. Arrangement of stars and distances.
 - 1. Galactic system.
 - a. Shape.
 - b. Distances.
 - c. Rotation.
 - d. Planetary and galactic nebulae.
 - e. Fullness of space.
 - (1). 30 tennis balls.
 - (2). All stars fill sky less than sun.
 - 2. Extra galactic nebulae.
 - a. Shapes
 - b. Distances.
 - c. States
 - d. Island universes
 - e. Sizes.
 - 3. Time. Space, Matter manifold.
 - a. Finiteness.
 - b. Einstein and reduction of matter to time-space complexes.
 - c. Warped space.
- III. Star mechanism.
 - A. Matter in more homogeneous state than in cool bodies.
 - B. Star temperatures.
 - 1. How determined.
 - C. Source of energy.
 - 1. Transmutation or annihilation of matter.
 - 2. Transformation of mass to radiation.
 - D. Approximate uniformity of mass of stars.
 - E. Stages in star-evolution.
 - F. Stars believe to be gases even when very dense.
- IV. Evolution of universe.
 - A. Study of properties of gases
 - B. Condensations in primordial diffuse matter.
 - 1. Sound as cause of condensations.
 - a. Compare with "Word" as cause of universe.
 - C. Accelerated rotations
 - 1. Detachment of masses equal to star-clusters and finally individual stars.
 - D. Expansion of universe.
- V. Age of universe and stars
 - A. Age of earth.
 - B. Age of Sun.
 - C. Age of Universe.

Re. power of a priori thought to reconstruct the world without
reference to experience quote from Helmholtz re. Hegel.

Hist. of Sci. p 313

Separation of science and philosophy in 19th century. Also division
of Science into sciences.

Twentieth cent. marked by movement toward synthesis.

One gramme = 9×10^{20} ergs.

Coal combustion = 5×10^{16} ergs.

" annihilation = 9×10^{26} .

18,000,000,000 times as much.

1000
1006

6000

Lecture on Astronomy Notes

THE UNIVERSE AROUND US

Chapter III

1. Method of determining age of earth by uranium. 144
2. Age between 1,400,000,000 and 3,400,000,000 yrs.
3. Astronomical method from shapes of orbits, gives figures ranging from 1,000,000,000 to 10,000,000,000 yrs. 146
4. Probable age 2,000,000,000 yrs.
5. Determination of ages of stars through law of equipartition of energy that applies to gases.
6. Stars are not completely but approximately in state of equipartition of energy. 152
7. Calculation shows that present state of equipartition of energy in stars would take from 5 to 10 millions of millions of years. 157
8. Based upon rate of radiation the sun would have to be ~~impossible~~ impossibly large (more than 100 times) to have existed more than 8 million million years ago. This checks within limits of other methods of calculation. 170
9. Source of energy to enable sun to radiate so long calculation shows could only be annihilation of matter. 176
10. Energy of combustion of one ton of coal 5×10^{16} ergs while energy from annihilation 9×10^{26} ergs or 18,000,000,000 times as much. One lb. of coal would supply all energy needs of England for two weeks. 180
11. Matter of universe of nebula as well as star stage cannot have been pouring forth energy forever else radiant energy in space would have raised temperature of earth to extremely high point. 315.
12. Suggested age about 200,000,000,000,000 years. 316.
13. The source of the Universe lies outside time space and matter 317
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