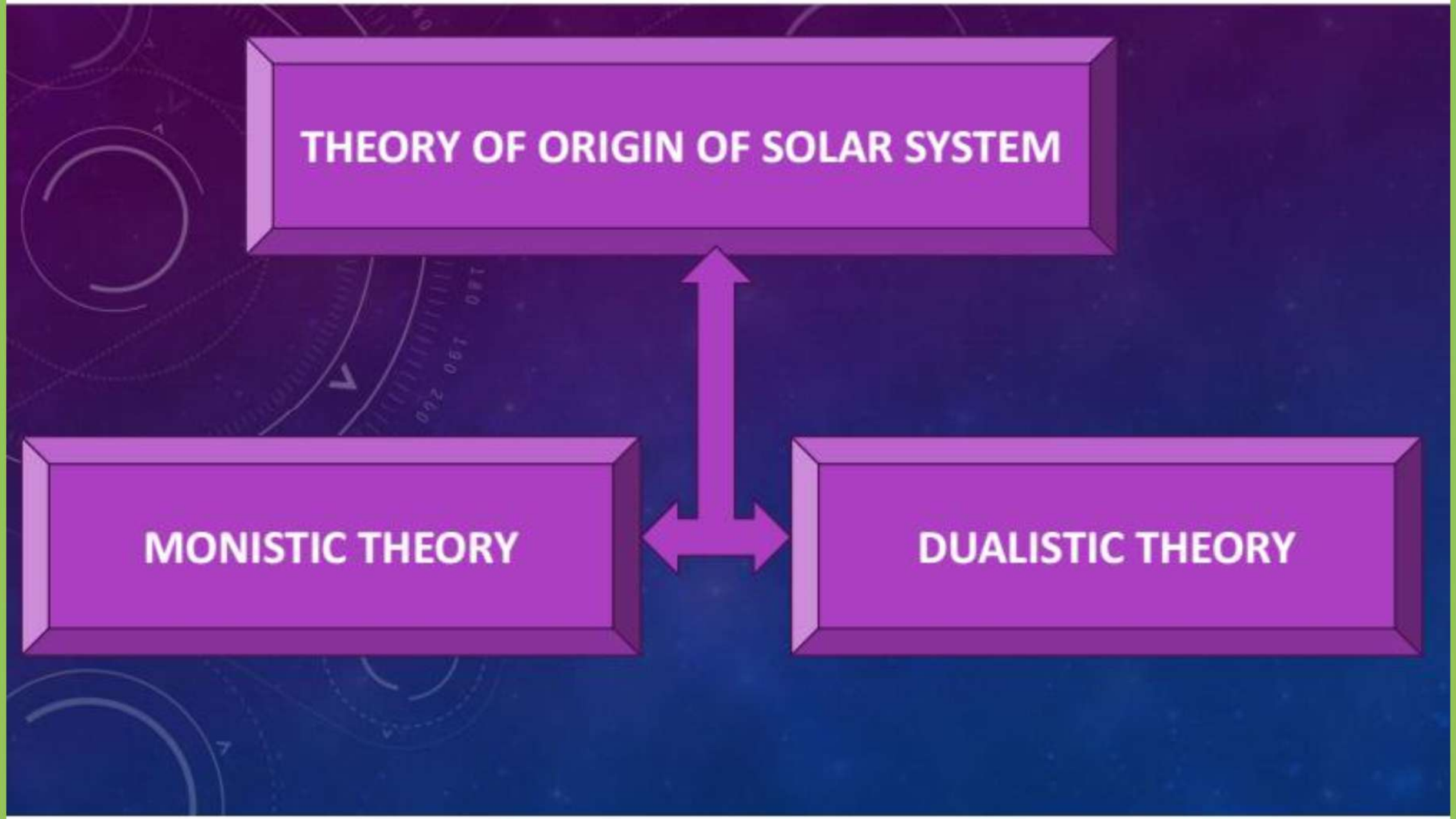
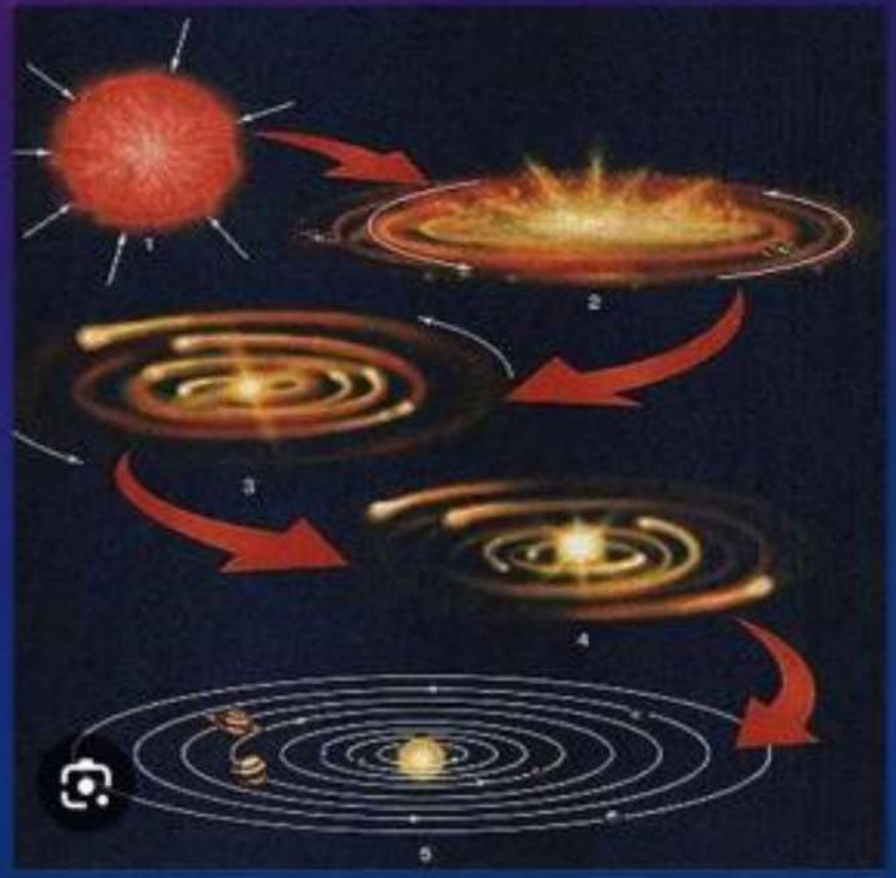
THEORY OF ORIGIN OF SOLAR SYSTEM


THEORY OF ORIGIN OF SOLAR SYSTEM
MONISTIC THEORY
DUALISTIC THEORY

Gaseous hypothesis of Kant(1755)



Gaseous hypothesis of Kant(1755)

- Kant postulated his gaseous hypothesis of the origin of the earth on the basis of a few assumptions. He assumed that supernaturally created primordial hard matter was scattered in the universe.

- In fact, according to Kant there was a primeval, slowly rotating cloud of gas (now called a nebula) and matter comprised of very cold, solid and motionless particles.

Gaseous hypothesis of Kant(1755)

- He further assumed that the particles began to collide against each other under their mutual gravitational attractions. This mutual attraction and collision between the particles generated random motion in the primordial matter. Collision of the particles also generated friction which generated heat, with the result the temperature of the primordial matter started rising

Gaseous hypothesis of Kant(1755)

•He further argued that the random motion of the particles also generated rotatory motion in the primordial matter. Thus, the original cold and motionless cloud of matter became in due course a vast hot nebula and started spinning (rotating) around its axis.

Gaseous hypothesis of Kant(1755)

•According to Kant **with the increase in temperature, the random motion as well as the rate of collision among the particles also increased. This gave extra impetus of the rate of rotatory motion (spinning) of the primordial matter.** The rise in temperature also changed the state of primordial matter from solid to gaseous particles. Thus, **the initial primordial matter gradually changed in hot rotating nebula.** With continuous rise in temperature and rate of rotatory motion the nebula started expanding in size.

Gaseous hypothesis of Kant(1755)

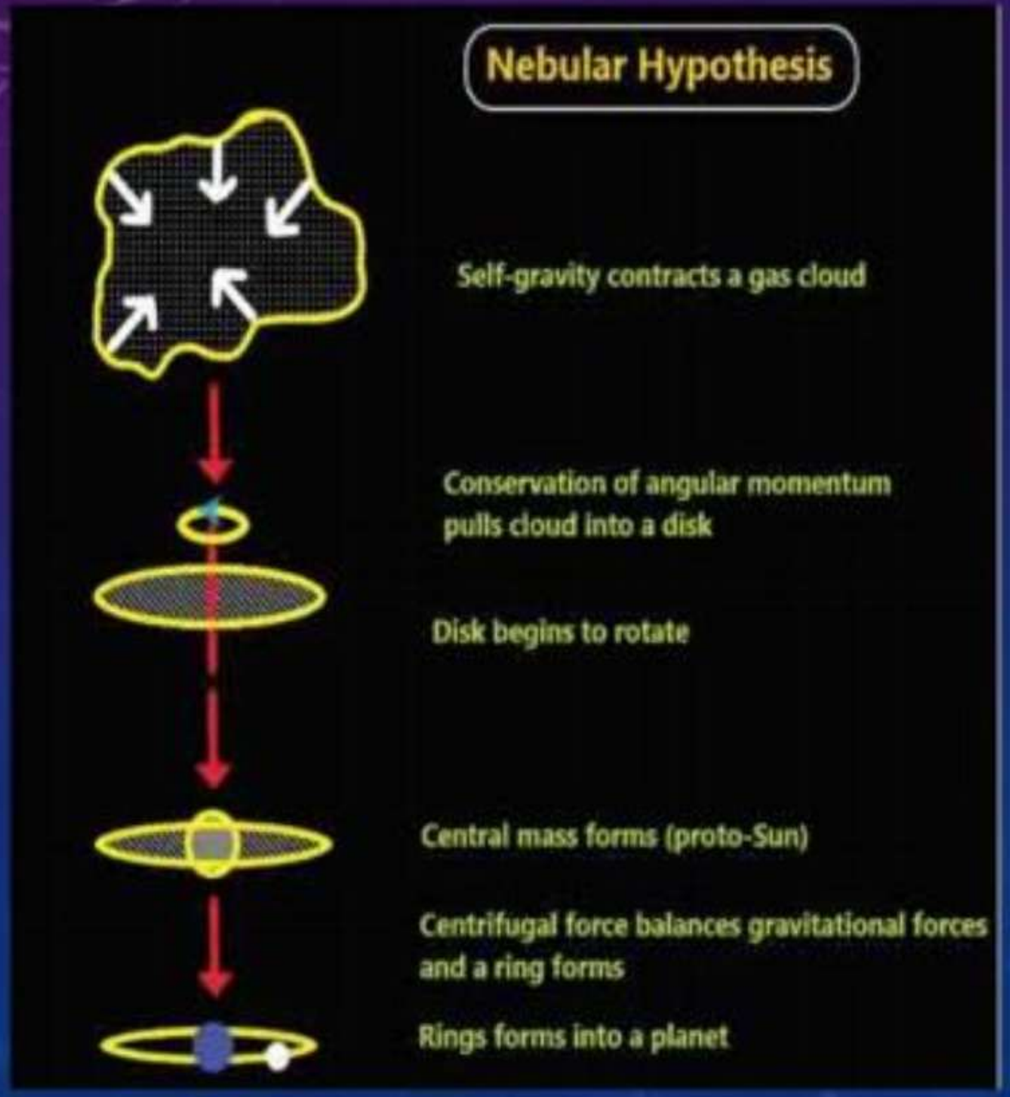
•According to Immanuel Kant **as the heat increased, the size of nebula increased and as the size of nebula increased, the angular velocity or rotatory speed further increased.** Due to continuous increase in the size of nebula the rotatory speed became so fast that the centrifugal force (away from the centre) exceeded the attractional or centripetal force (directed towards the centre).

•The **nebula started spinning so rapidly that an irregular ring was separated from the middle part of the nebula and was ultimately thrown off due to centrifugal force.** By the repetition of the same process a system of concentric rings (nine) were separated from the nebula. The residual central mass of the nebula remained as the sun.

Evaluation

Nebular hypothesis of Laplace(1796)

Nebular hypothesis of Laplace(1796)



Assumptions

- He assumed that there was a huge and hot gaseous nebula in the space.
- From the very beginning huge and hot nebula was rotating on its axis.
- The nebula was continuously cooling due to loss of heat from its outer surface through the process of radiation and thus it was continuously reduced in size due to contraction on cooling.

- **There was a nebula cloud composed of Helium, Hydrogen, and dust particles, with a size similar to that of the present-day solar system.**

- Since, Nebula was continuously reduced in size due to gradual loss of heat from the outer surface of the nebula through radiation.

- Thus, Reduction in the size and volume of the nebula increased the circular velocity (rotatory motion) of the nebula.

- Due to the increase in velocity, nebula started spinning at very fast speed and consequently the centrifugal force becomes so great that it exceeded the centripetal force.

- Consequently, the Outer surface was condensed due to excessive cooling and so it could not rotate with the still cooling and contracting the central nucleus of the nebula.
- And, Thus the outer ring was separated from the remaining part of the nebula And this separated ring started moving around the nebula.
- Laplace further maintained that the original ring was divided into nine rings and each ring moved away from the outer ring.
- Thus, nine planets were formed from the nine rings and the remaining central nucleus of the nebula become the Sun.

Evaluations

चैम्बरलीन की ग्रहाणु परिकल्पना।

The planetesimal hypothesis of Chamberlin (1905) → 1905

ग्रहाणु → Planetesimal

meaning

ग्रहों के अणु → वैसे पदार्थ जिससे ग्रहों का निर्माण

ग्रहाणु → चैम्बरलीन

Planatmiel → वैसे पदार्थ जिससे ग्रहों का निर्माण हुआ है

The Matarial that forms planets.

पैम्बरलीन की मान्यतायें

Pre assumption

1. ब्रह्माण्ड में केवल सूर्य के रूप में एक सितारा नहीं थी अपितु एक दूसरा/अन्य तारा भी विद्यमान था।

a. There was presence of a star in universe

2. → सूर्य प्रारंभ में ठोस अवस्था में था।

In Beginning Sun was in solid state.

दूसरा तारा

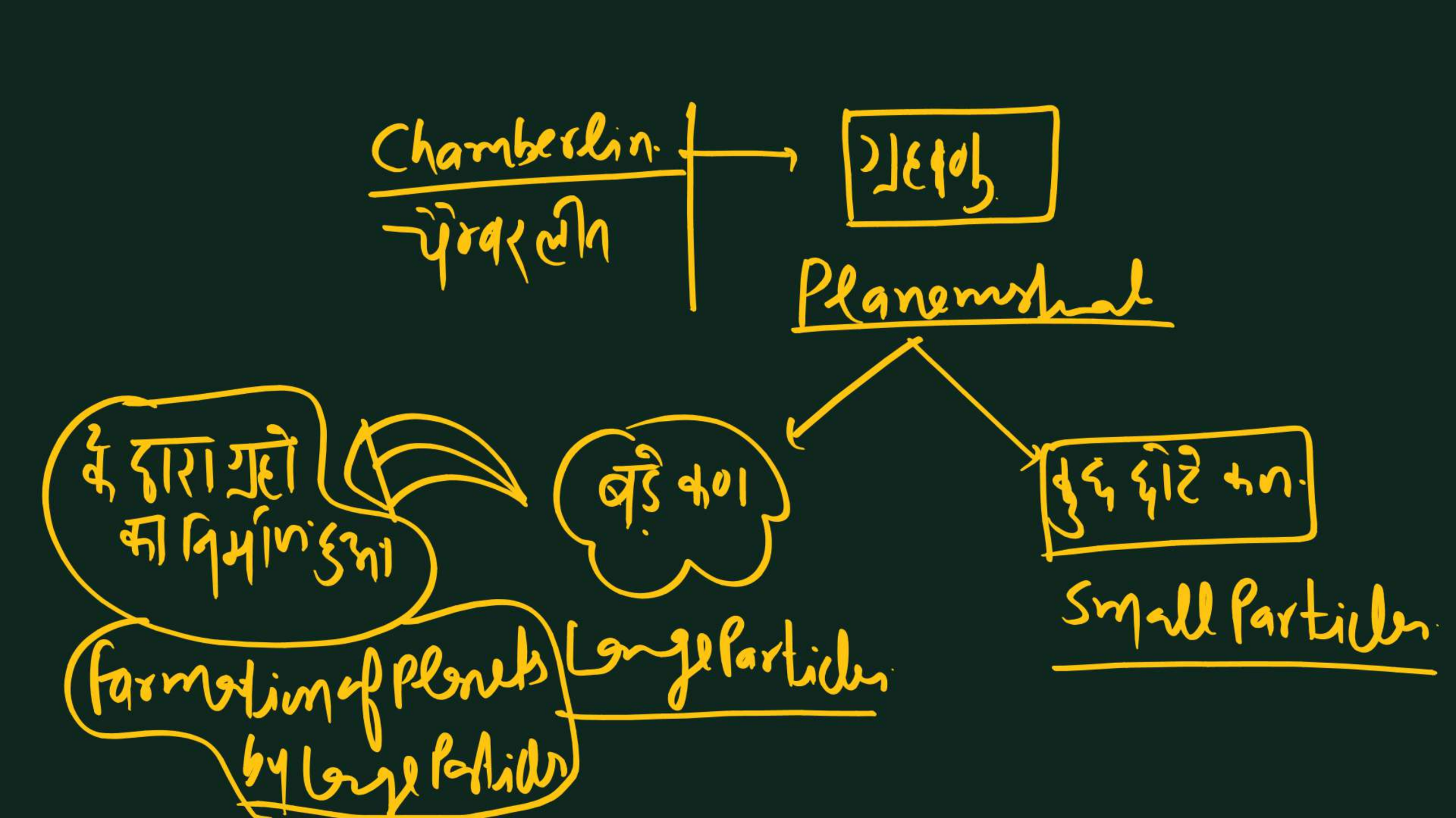
Material from sun

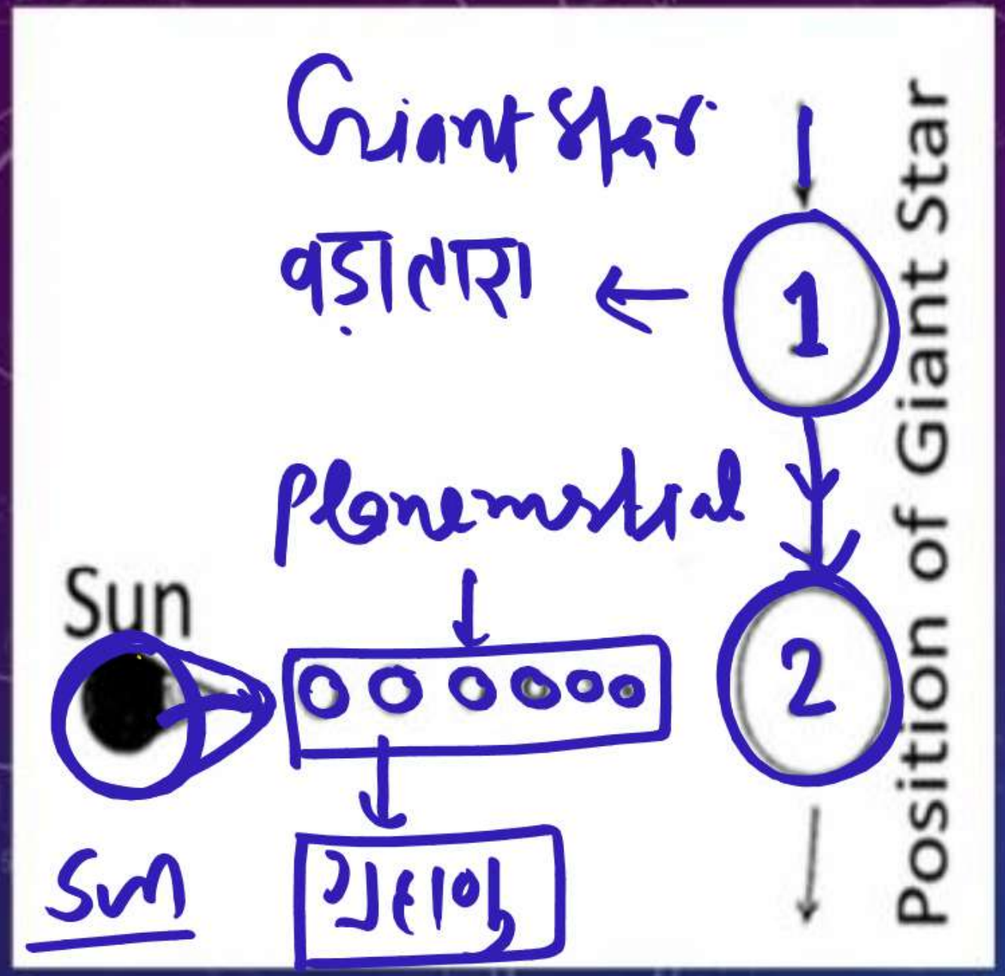
सूर्य का पदार्थ बाहर निकला।

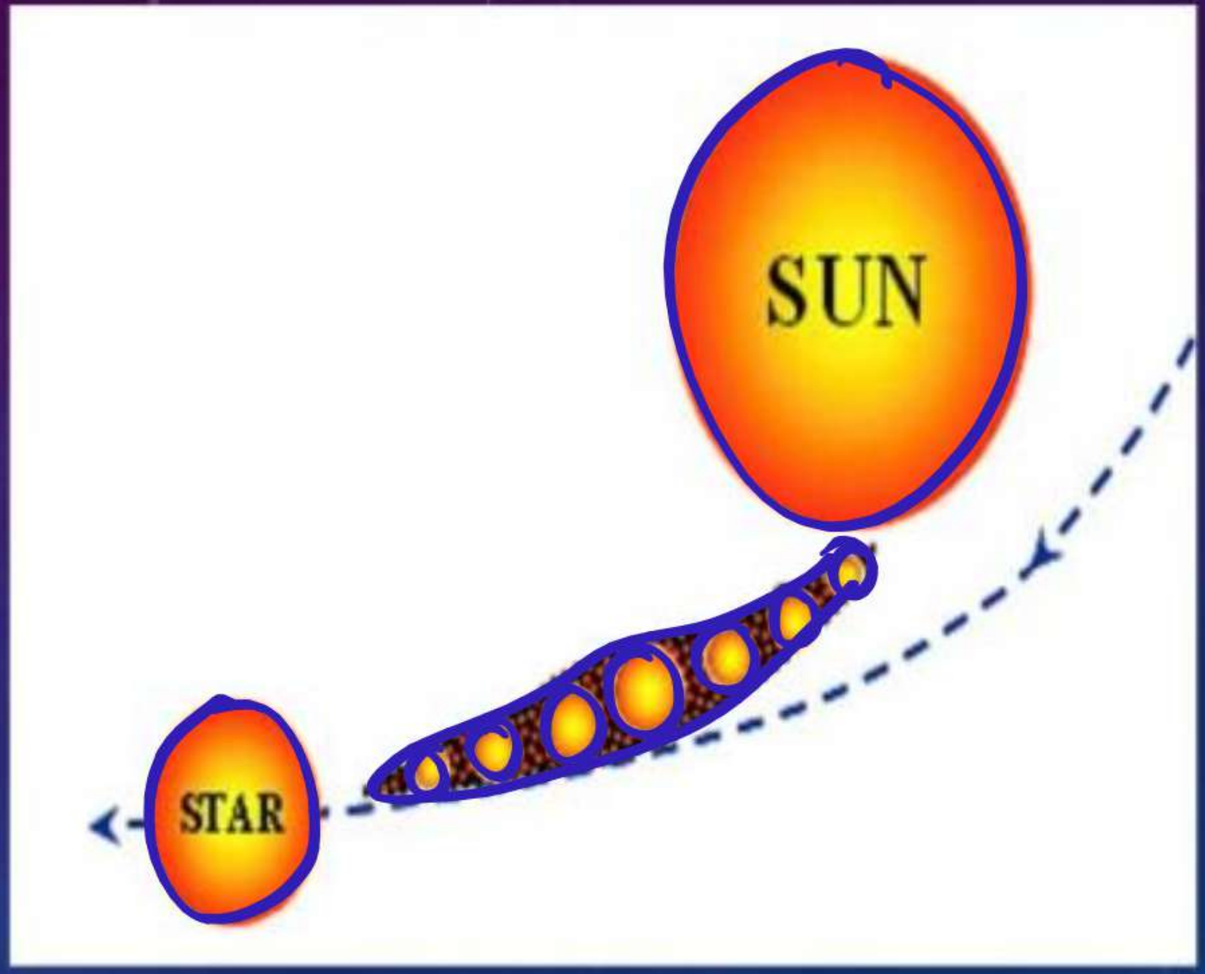
पुरुत्वाकर्षण बल के कारण
due to gravitational force

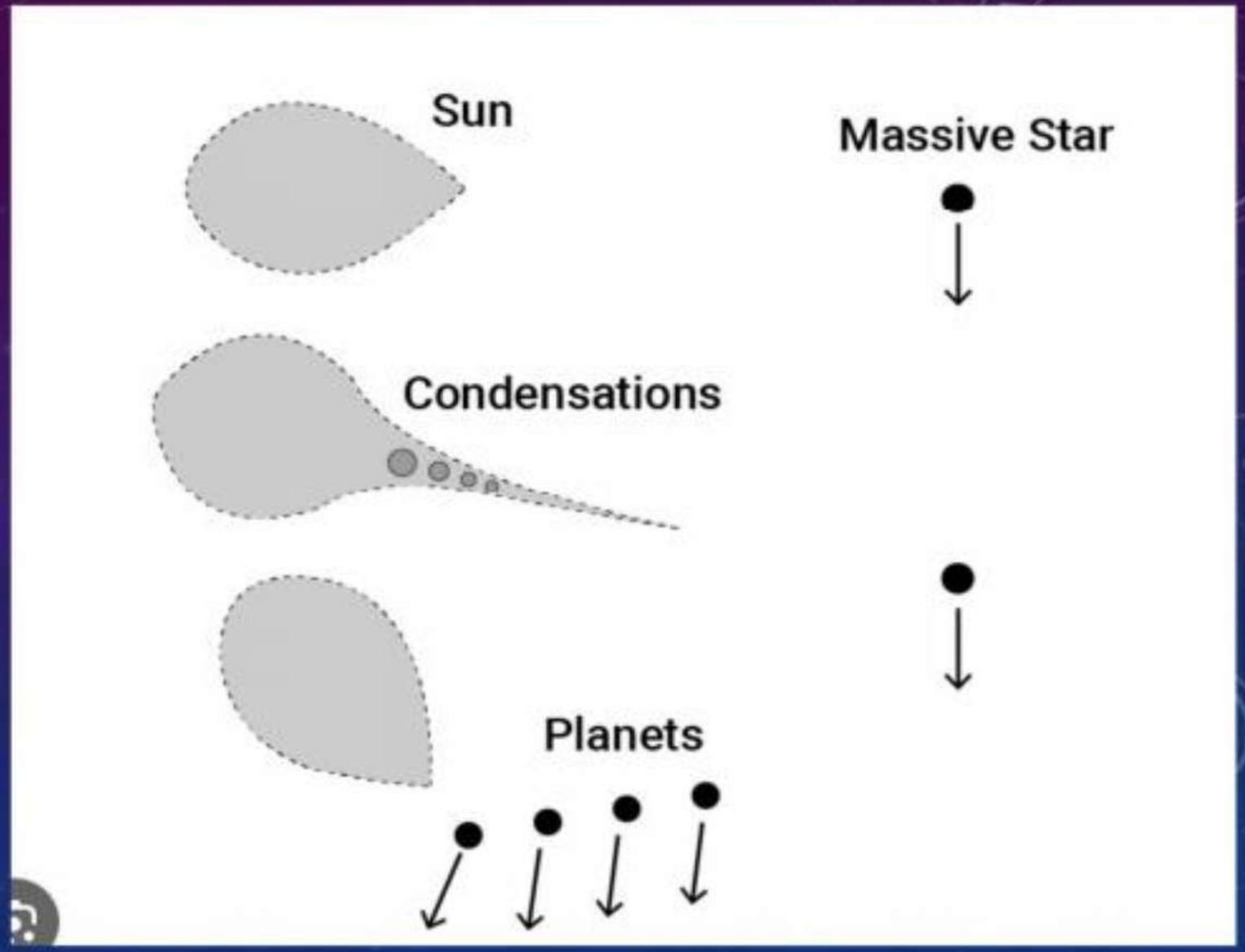
पैम्बरलिन के अनुसार यही ग्रहाणु है।

These Materials are the example of Planetesimal


Chamberlin
चैंबरलीन
ग्रहाणु
Planetesimal
के द्वारा ग्रहो का निर्माण हुआ
बड़े कण
छोटे कण
Formation of planets by Large Particles
Large Particles
Small Particles


Giant star
बड़ा तारा
1
Planetoid
Sun
2
Position of Giant Star
Sun
ग्रहिका


SUN
STAR


Sun
Massive Star
Condensations
Planets

- According to **Chamberlin initially there were two heavenly bodies (stars) in the universe** –
  - **Proto-Sun**
  - and its **Companion Star or Intruding star**
- The behavior and properties of **proto-sun** were not like other stars, It was formed of **very small particles which were cold and solid**. Thus, the proto-sun, unlike Laplace's nebula, was not hot and gaseous rather it was formed of solid particles and was cold and circular in shape. There was another star, termed as **'intruding star' or 'companion star** which was destined **to pass very close the proto-sun**.

- When the intruding star came very close to the the Proto-Sun infinite **number of small particles were detached from the outer surface of proto-sun** due to massive gravitational pull exerted by the giant **intruding star.** This matter which is **dust, gases, rock fragments eventually accrete forming planets & other celestial bodies** that revolve around the proto sun.

- Initially, the detached particles or planetesimals were just like **dust particles**. The planetesimals were **not of uniform size rather a few planetesimals around the proto-sun were of fairly big size**. These larger planetesimals became nuclei for the formation of future possible planets. Gradually, large planetesimals started attracting small planetesimals.

•Thus, numerous small planetesimals were accreted (added) to the nuclei of large planetesimals and ultimately these large planetesimals grew in the form of planets due to continuous accretion of infinite number of planetsimals. **With the passage of time, the remaining proto-sun changed into the present-day sun**. The satellites of the planets were created due to the repetition of the same processes and mechanisms.

Structure of Planets are not similar

मूल्यांकन
Evaluation

① सूर्य ठोस अवस्था में नहीं था।
Sun was not in Solid state.

② विशालतारे की उत्पत्ति कैसे?
What is The Reason of formation of Giant Star

③ सभी ग्रहों की संरचना एक समान नहीं है

④ 8 ग्रह ही क्यों बने?

Why formation only eight Planets?

Evaluations

जीन

जेम्स जींस की ज्वारीय परिकल्पना

1919

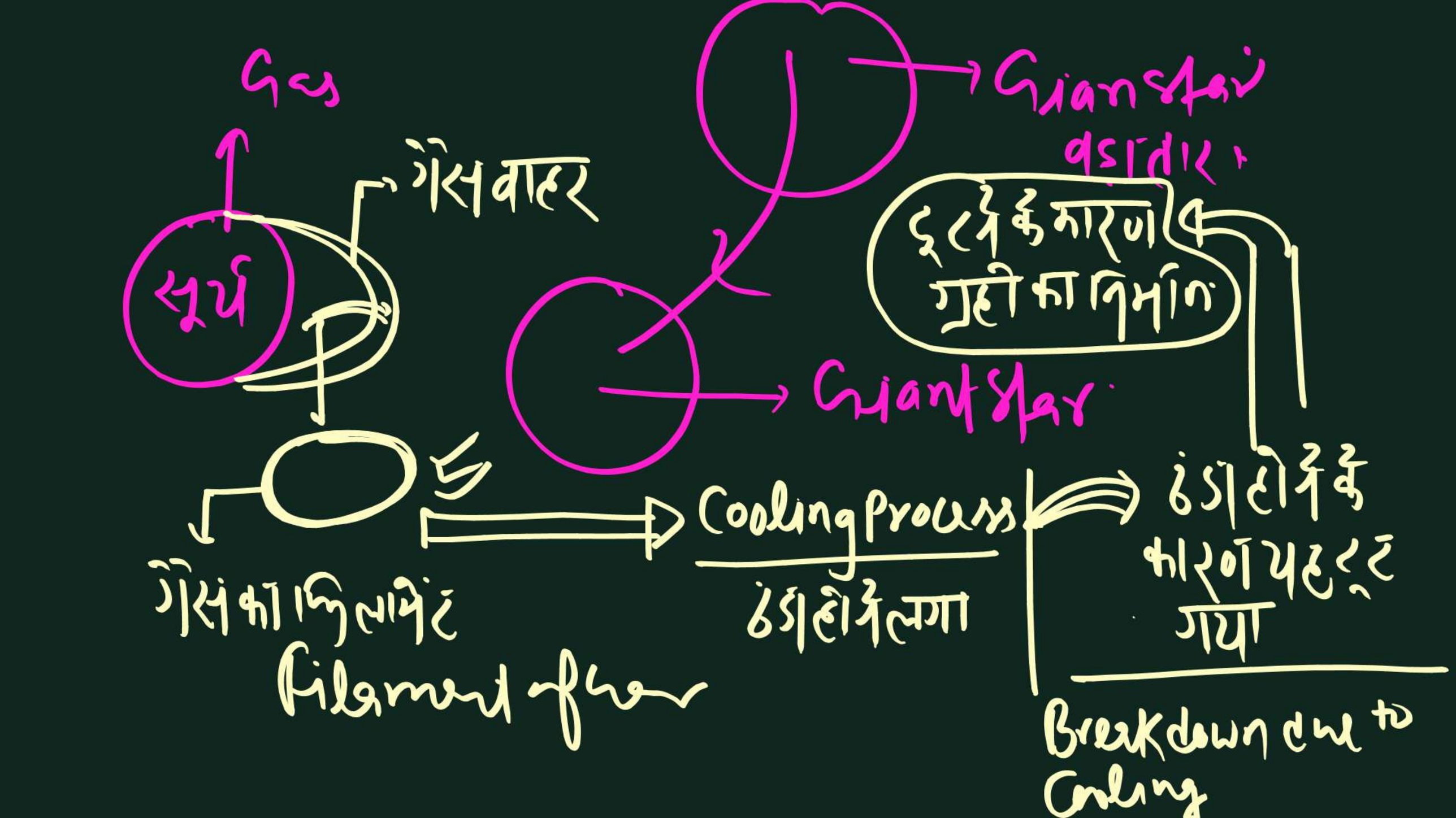
Tidal Concept of James Jeans

1919

→ सूर्य गैसीय अवस्था में था।

Sun was in Gaseous state

↳ Sun and Giant Star | दूसरा तारा सूर्य के बिल्कुल पास था।


Gas
गैस बाहर
सूर्य
Giant star
बड़ा तारा
दूरी के कारण
ग्रही का निर्माण
Giant star
गैस का फिलामेंट
Filament of gas
Cooling Process
ठंडा होने लगा
ठंडा होने के
कारण यह टूट
गया
Breakdown due to
Cooling

Filament of Gases separated from Sun due to gravitation

↓

Cooling Process of Filament

↓

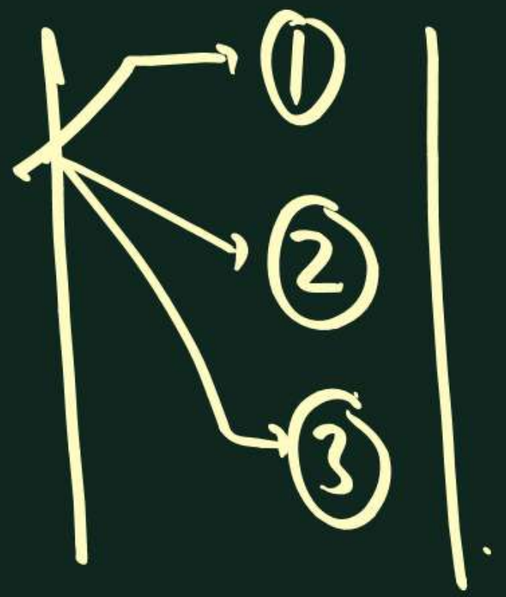
Filament Break down between eight Parts.

↓

and Planets are formed.

आलोचना

Critically Analyse



लाप्लास की विहारिका परिकल्पना तथा चेम्बरलीन की परिकल्पना की तुलनात्मक व्याख्या करें। (125 words) 8 Marks

Comment on comparative discussion of Laplace and Chamberlin।