

****Creation of New ‘Stars and Planets’ in
Pawan Upadhyay’s Pressure–Curvature Law of Gravity (PPC Law of Gravity)****

Author: Pawan Upadhyay

Affiliation: Independent Researcher

Email: pawanupadhyay28@hotmail.com

Framework: Pawan Upadhyay’s Pressure–Curvature Law of Gravity (PPC Law)

My ORCID iD: <https://orcid.org/0009-0007-9077-5924>

Abstract

The formation of stars and planets is a fundamental process in astrophysics, commonly attributed to gravitational collapse within interstellar matter clouds. In this paper, the creation of new stars (protostars) and new planets (protoplanets) is examined within Pawan Upadhyay’s Pressure–Curvature Law of Gravity (PPC Law), which interprets gravity as a pressure-driven phenomenon arising from mass–energy density. It is shown that stellar and planetary formation occurs in dense cloudy regions of matter, where mass–energy density and gravitational pressure are sufficiently high to generate strong spacetime curvature, compression, and collapse. Temperature is treated as a secondary consequence of pressure-driven evolution rather than a primary condition. This interpretation remains fully consistent with General Relativity and established astrophysical observations.

1. Introduction

Stars and planets do not form uniformly throughout space. Observational evidence shows that they emerge from dense clouds of matter composed of gas, dust, and energy-bearing particles. Traditional descriptions often emphasize “cold” molecular clouds; however, temperature alone is not the determining factor in structure formation.

Pawan Upadhyay’s Pressure–Curvature Law of Gravity (PPC Law) provides a physically intuitive framework in which mass–energy density generates gravitational pressure, and pressure produces spacetime curvature and motion. This paper applies the PPC framework to explain why stars and planets form specifically in dense cloudy regions of space, independent of whether those regions are initially cold or become warm during collapse.

2. Mass–Energy Density and Gravitational Pressure

In PPC gravity, mass and energy are inseparable. Matter always carries energy. Mass density ρ corresponds to energy density:

$$E_d = \rho c^2$$

Gravitational pressure is associated with energy density through:

$$P_g = w E_d$$

where w represents the physical state of matter–energy.

High matter density therefore implies high energy density, which in turn produces high gravitational pressure. This pressure is the primary driver of collapse and structure formation.

3. Dense Cloudy Regions of Matter in Space

Star and planet formation occurs in dense cloudy regions of matter, such as:

- molecular clouds,
- nebular matter concentrations,
- collapsing gas and dust clouds,
- protoplanetary disks.

These regions are characterized by:

- high mass–energy density,
- strong gravitational pressure,
- enhanced spacetime curvature.

Such regions may initially be cooler than stellar interiors, but during collapse they often become warm or hot due to compression and energy concentration. Thus, density and pressure, not absolute temperature, are the essential conditions for formation.

4. Formation of Baby Stars (Protostars)

4.1 Density Enhancement and Compression

Within a dense matter cloud, interactions, turbulence, and external influences create localized regions of higher density. In PPC terms:

- increased density → increased gravitational pressure,
- pressure gradients → inward-directed field force.

This initiates compression toward a central region.

4.2 Collapse and Energy Concentration

As collapse proceeds:

- gravitational pressure increases,
- spacetime curvature strengthens,
- matter heats due to rising energy density.

A protostar (baby star) forms as a compact, pressure-supported structure.

4.3 Pressure Balance and Stability

A protostar stabilizes when:

- inward gravitational pressure
- balances outward thermal and radiation pressure.

This balance determines whether the object evolves into a stable star or dissipates.

5. Formation of New Planets (Protoplanets)

5.1 Protoplanetary Disks

Around a young star, rotating matter forms a protoplanetary disk.

In PPC gravity:

- the star's strong gravitational pressure shapes disk curvature,
- Pressure gradients guide matter motion within the disk.

5.2 Accretion and Growth

Dust and matter particles collide, interact, and bind due to:

- surface pressure forces,
- energy dissipation,
- local gravitational pressure.

Over time, these interactions produce planetesimals and eventually planets.

5.3 Pressure Threshold for Planet Formation

Planet formation occurs only where:

- mass–energy density is sufficiently high,
- gravitational pressure exceeds a threshold,
- Spacetime curvature allows stable orbital motion.

This explains why planets form near stars rather than in diffuse interstellar regions.

6. Field Force and Surface Force in Formation

Two pressure-related forces operate in PPC gravity:

1. **Field Force (pressure gradient):**

$$\mathbf{F}_{\text{field}} = -\nabla P_g$$

2. **Surface Force (pressure acting on area):**

$$F_p = P_g A$$

Both are essential in star and planet formation.

7. Role of Spacetime Curvature

Gravitational pressure produces spacetime curvature, which:

- guides matter trajectories,
- confines matter within forming systems,
- supports stable orbital motion.

Formation is therefore a combined outcome of pressure, curvature, and motion.

8. Consistency with General Relativity

The PPC interpretation does not modify Einstein's field equations.

Instead, it:

- provides physical meaning to pressure terms in the stress–energy tensor,
- clarifies the causal role of mass–energy density,
- remains fully consistent with observational astrophysics.

9. Implications

The PPC framework explains:

- why stars and planets form only in dense cloudy regions,
- why low-density space remains structure-free,
- why temperature increases during formation,
- how matter, energy, and geometry evolve together.

10. Conclusion

The creation of new stars and planets occurs in dense cloudy regions of matter, where mass–energy density generates strong gravitational pressure and spacetime curvature. Within Pawan Upadhyay's Pressure–Curvature Law of Gravity, star and planet formation emerges naturally as a pressure-driven process governed by curvature and motion. Density and pressure are the primary conditions; temperature is a consequence rather than a cause. This interpretation provides clear physical intuition while remaining fully consistent with established gravitational theory.

Key Statement:

In Pawan Upadhyay's Pressure–Curvature Law of Gravity, new stars and planets form exclusively in dense cloudy regions of matter where high gravitational pressure and spacetime curvature enable collapse and binding.

References:

1. Misner, C. W., Thorne, K. S., Wheeler, J. A., *Gravitation*, W. H. Freeman, 1973.

2. Carroll, S. M., Spacetime and Geometry, Addison-Wesley, 2004.
 3. Shu, F. H., The Physics of Astrophysics, University Science Books, 1987.
 4. Padmanabhan, T., Gravitation: Foundations and Frontiers, Cambridge University Press, 2010.
-

© 2025-2026 Pawan Upadhyay. All rights reserved.

This document contains original research and discoveries by the author.
No part of this work may be modified, adapted, or transformed without
explicit written permission from the author.

License: Creative Commons Attribution–NoDerivatives 4.0 International
(CC BY-ND 4.0)