What is the vacuum level of space above earth?

Answer

The vacuum level of space above Earth is not uniform and can vary depending on altitude and location, but we can describe it in general terms:

- **Low Earth Orbit (LEO)**: This region extends from about 160 km (100 miles) to 2,000 km (1,243 miles) above Earth's surface. Here, the atmospheric pressure drops dramatically. At around 100 km (62 miles), which is the Karman line often considered the start of space, the pressure is approximately **10^-7 Pascal (Pa)** or lower. By the time you reach an altitude of 400 km (where the ISS orbits), the pressure is in the range of **10^-10 to 10^-12 Pa**.
- **Medium Earth Orbit (MEO)**: Between 2,000 km and 36,000 km, the vacuum becomes even more pronounced. The pressure here is on the order of **10^-12 Pa** or less.
- **Geostationary Orbit (GEO)**: At about 36,000 km, where satellites maintain a fixed position relative to Earth's surface, the pressure is approximately **10^-14 Pa**.
- **Beyond GEO**: As you move further out, the pressure continues to decrease. In interplanetary space, far from any planetary body, you're looking at pressures around **10^-16 Pa** or less.

These pressures are incredibly low compared to atmospheric pressure at sea level, which is about 101,325 Pa (or 1 atmosphere). The term "vacuum" in space refers to these extremely low pressures where there are very few particles per cubic meter, making it a near-perfect vacuum by Earth standards.

Note that these are approximate values, and the actual vacuum level can vary due to solar activity, Earth's magnetic field, and other factors influencing the upper atmosphere's density.