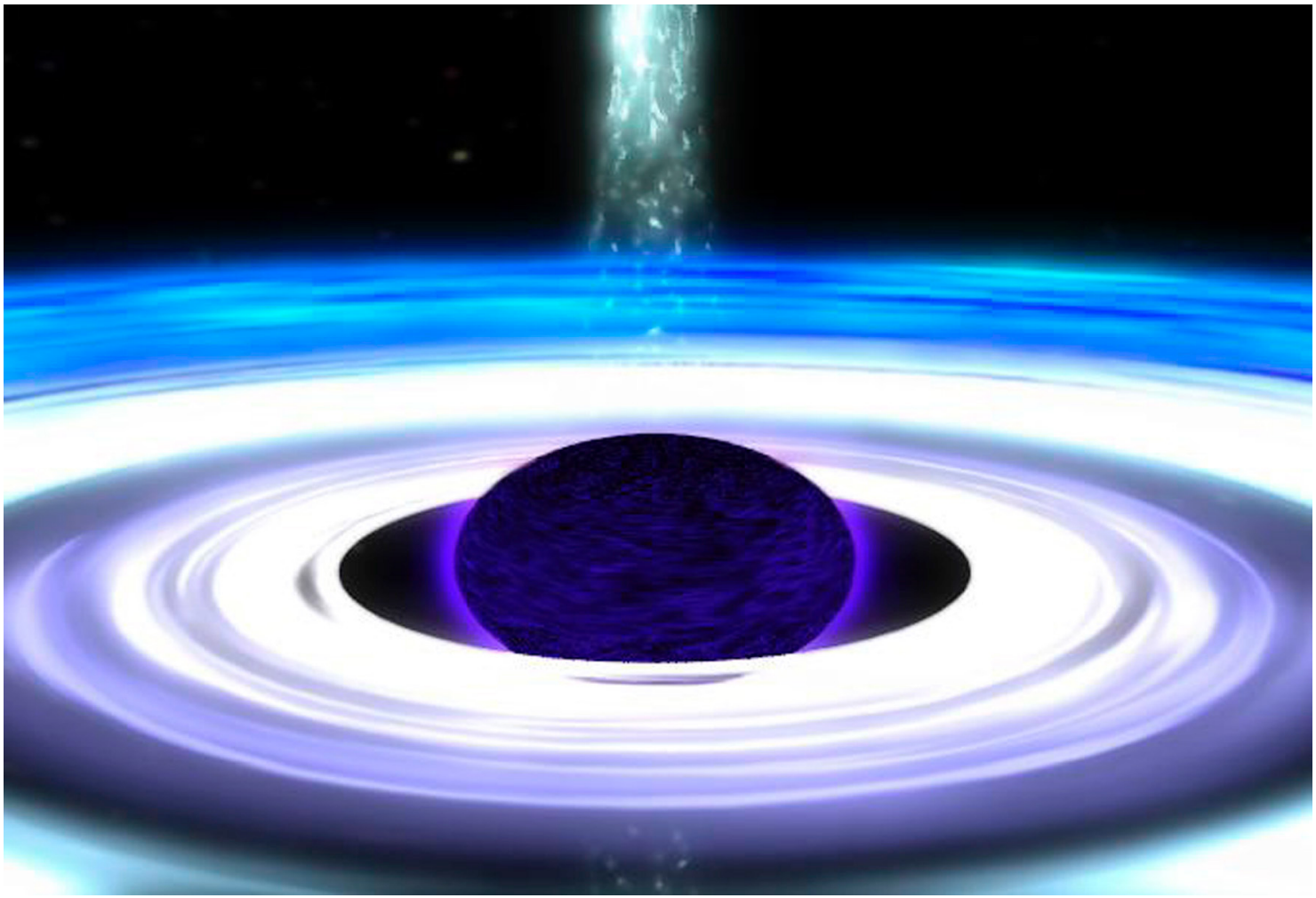
Session 10: Black Holes

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The Main Concepts…

1. Black holes are the end points of stellar evolution for the very massive stars
2. The idea of escape velocity
3. Black holes are objects where the escape velocity exceeds the speed of light

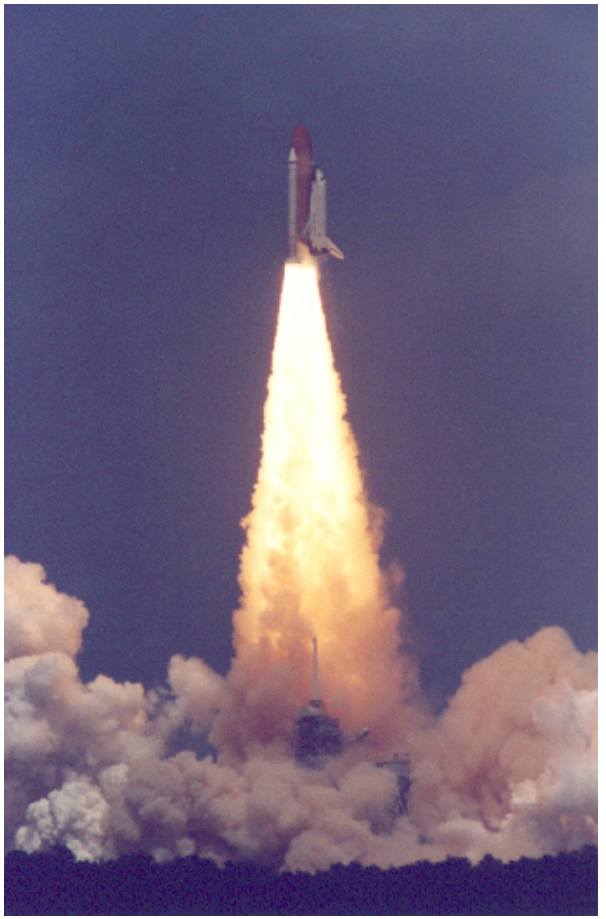


Escape Velocity

On the surface of the Earth, the faster you throw something upwards, the higher it goes before coming down.

If you throw something up at 25,000mph (7 miles per second) or more, it can leave the Earth's gravitational pull entirely and travel freely into space.

This speed is called the **escape velocity**; objects with a stronger gravitational pull than the Earth have a larger escape velocity.





Black Holes

- A black hole is an object with such strong gravity that the escape velocity is the **speed of light.**
- Since light cannot escape, black holes appear black!
- Also, since nothing can travel faster than light, **nothing can escape from a black hole.**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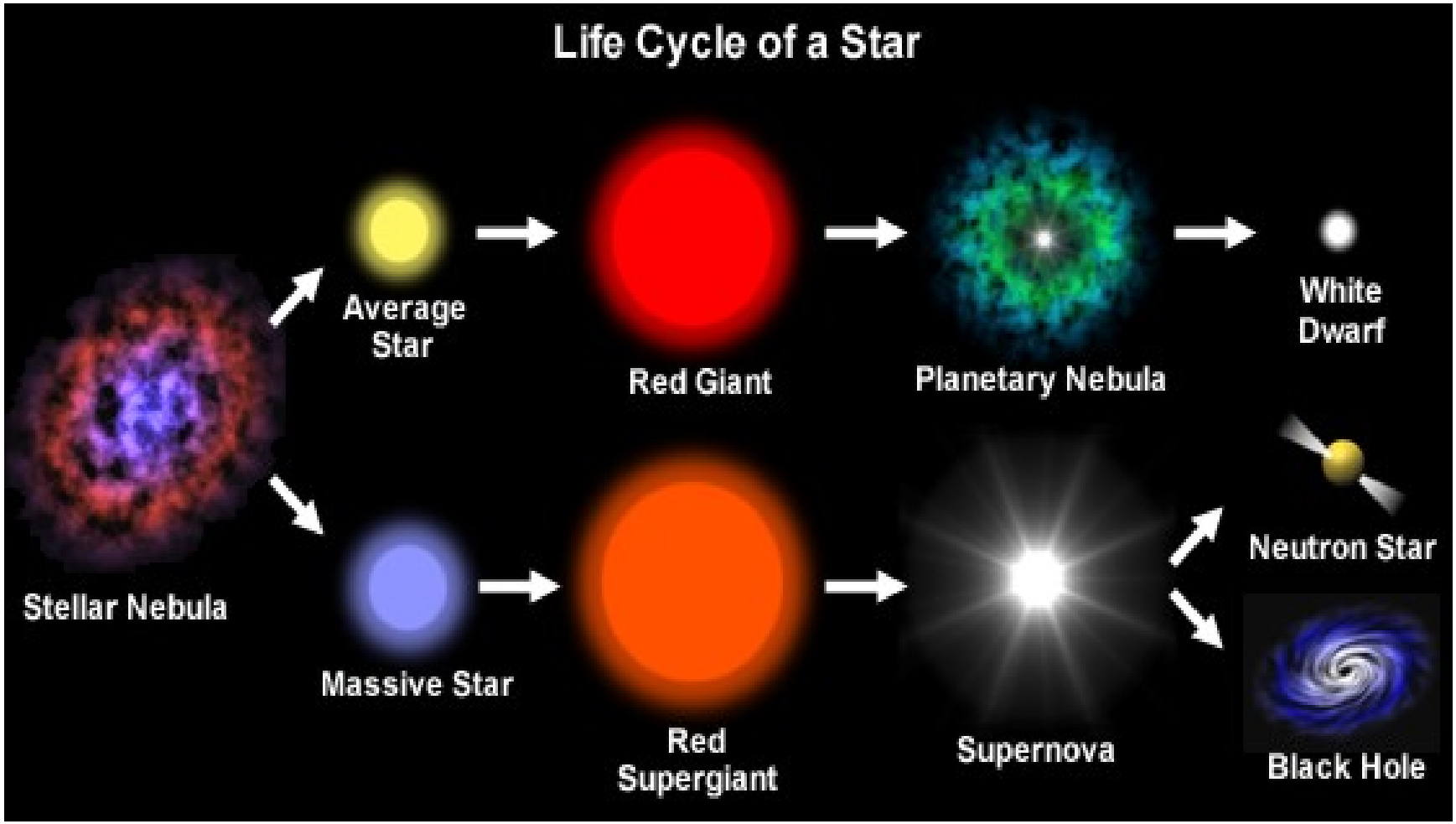
Life Cycle of a Star

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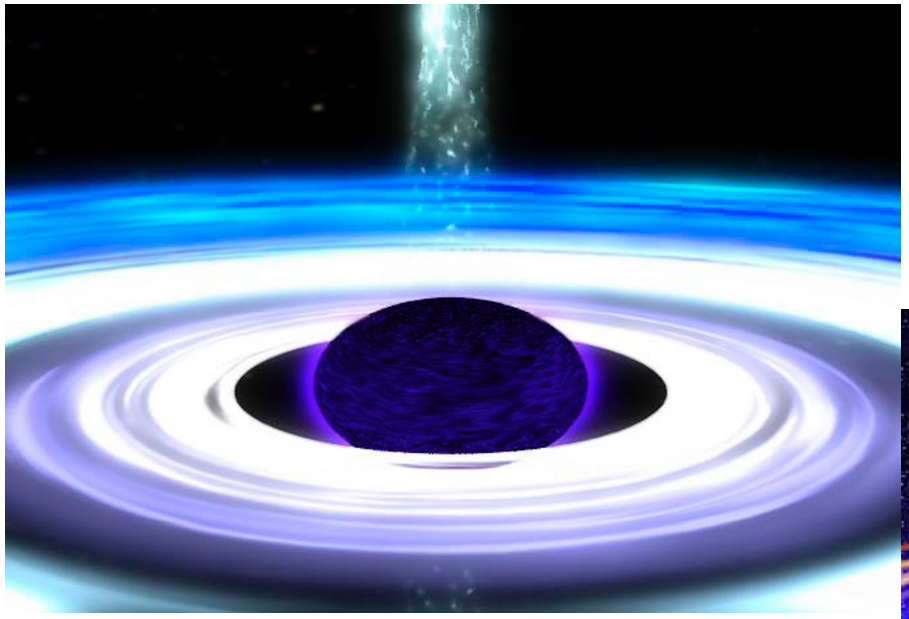
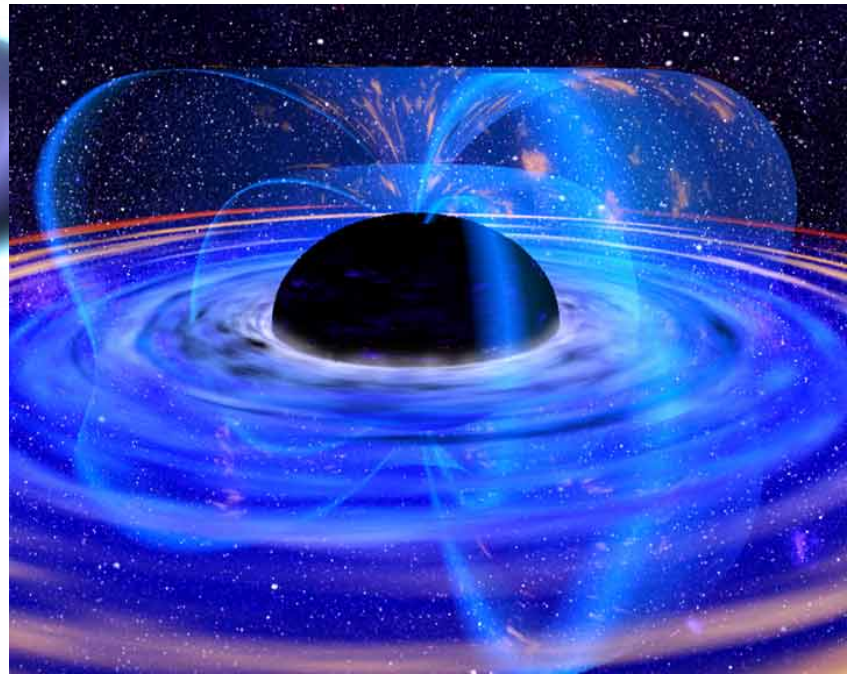
Two Types of Black Holes



"Supermassive black holes"
Found at centers of galaxies, but origin is a mystery… have radii 1 million - 1 billion km.



"Stellar-mass black holes"
From the collapsed core of a dead massive star… can have radii in range 3-60 km.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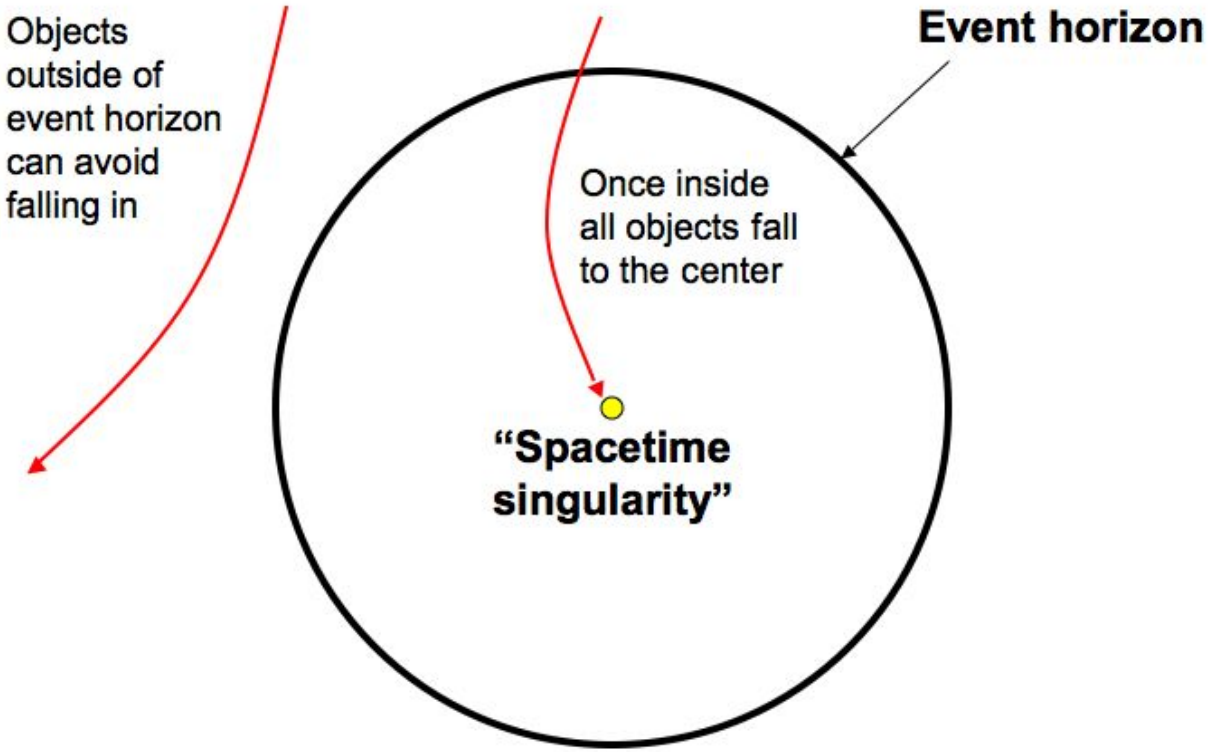
Structure of a Black Hole

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