WHITE DWARF

Sirius B isn't visible from Earth. The much larger Sirius A outshines it.

Do You Know?

Binary stars, or pairs of stars orbiting each other, are fairly common. As many as half the stars in the Milky Way might be binary stars!

THE WHITE-HOT CORE

Manolo had seen Sirius many times. It's one of the closest stars to Earth. But as the *Stella* flew closer, he spotted something unexpected. "Kara, aim the Star Reader at that little white dot next to Sirius," he ordered.

Kara tapped the screen and furrowed her brow. "It's a star with about the same mass as the Sun," she said. "But its diameter is only as big as Earth's. How can that be?"

"Ah, that's Sirius B!" Captain Gamma proclaimed. "Sirius is actually two stars orbiting each other—Sirius A and B."

"Wow! This star is unbelievably hot—25,000 degrees Celsius!" Kara exclaimed.

"It must be a white dwarf," Manolo said in awe. "It's the core of an old star that burned up all its hydrogen.

"If there's no hydrogen fuel left, why is it so hot and bright?" Kara asked.

"It has energy left over from nuclear fusion," Manolo explained. "It's like when a car engine stays hot even after the car is turned off. Sirius B will stay hot for billions of years."

White dwarfs can be as small as Earth. But they have as much mass as the Sun!

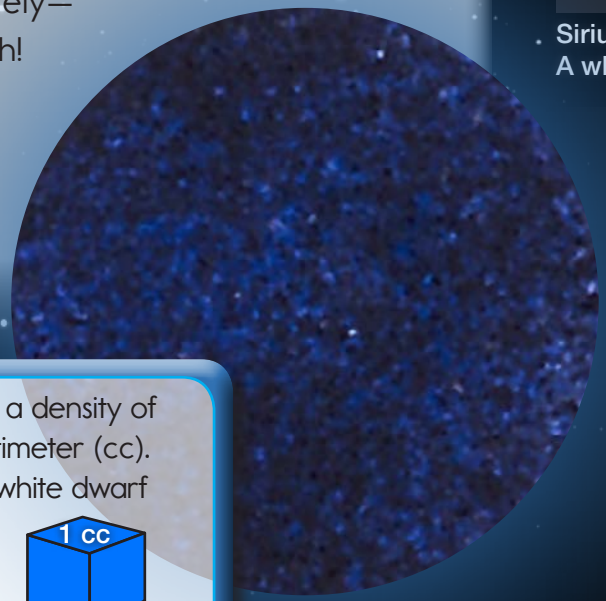
Credits: left: courtesy of NASA, ESA and G. Bacon (STScI); right: courtesy of ESA and NASA

Black Dwarfs

When a star has used up all its hydrogen fuel, it expands rapidly. Eventually, it collapses under its own gravity and becomes a white dwarf. Although it's out of fuel, a white dwarf still shines brightly, like an electric burner that glows after you turn off the stove.

Like the electric burner, a white dwarf will eventually cool. However, a white dwarf has a long life span. In fact, it can take *hundreds of billions* of years to cool. What's left is a cold, dark object called a *black dwarf.*

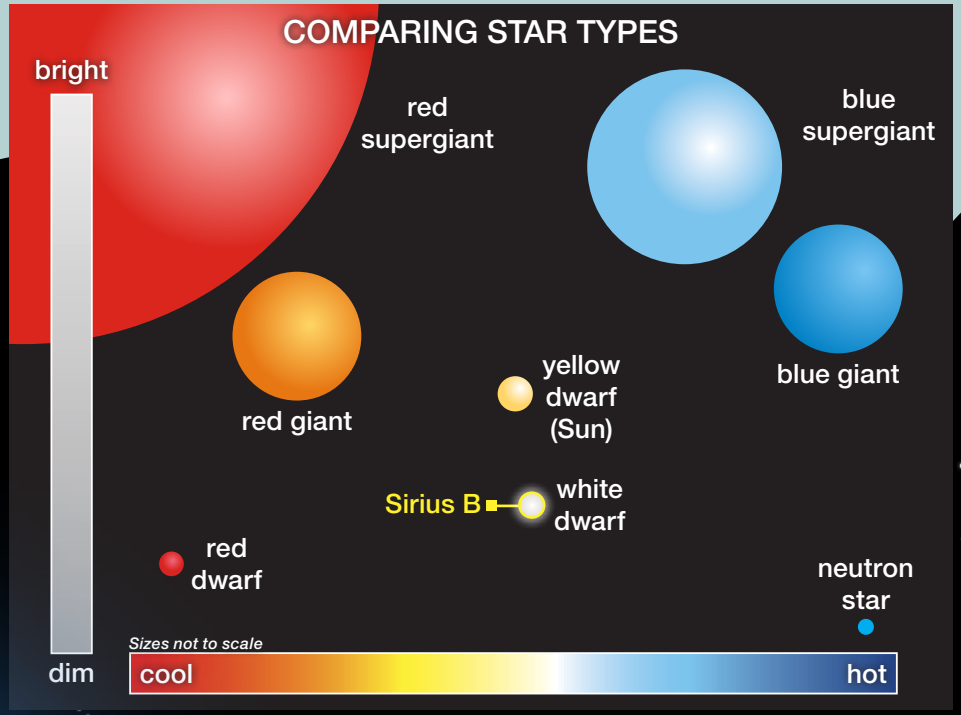
Actually, black dwarfs only exist in theory. Scientists have never observed them because no white dwarfs have had the chance to cool completely—the universe isn't old enough! The universe is "only" 13.7 billion years old. So it will be a long time until any black dwarfs form.



Math Moment

A white dwarf star has a density of 1,000 kilograms per cubic centimeter (cc). Imagine you have a block of white dwarf matter that's 108 cc in size, or about the size of a deck of cards. How much does your block of matter weigh?

1 cc = 1,000 kg



Sirius B is a white dwarf star. It looks white because it is fairly hot. A white dwarf star isn't very bright compared to other star types.