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# JWST Captures Gigantic Stardust Waves Outshining Our Solar System

## Description

Carbon-rich cosmic dust originates from a variety of celestial sources and disperses into the vastness of space, playing an essential role in the sustenance of life and the formation of rocky planets such as Earth.

However, as astronomers direct their telescopes toward the cosmos, they frequently encounter this cosmic dust, which obstructs their line of sight and complicates their observations.

One of the primary motivations behind the construction of the James Webb Space Telescope (JWST) was its capacity to penetrate this obscuring dust through infrared imaging, thereby providing unprecedented insights into various astrophysical phenomena. Recently, JWST undertook the task of directly observing the dust itself.

The binary star system Wolf-Rayet 140 (WR 140), located approximately 5,000 light-years away in the constellation Cygnus, was the focus of this inquiry. A 2022 publication in *Nature Astronomy* disclosed critical information about this system, revealing that the stellar winds emanating from its two constituent stars collide, creating rings of carbon-rich dust that dynamically expand into space.

The authors highlighted the significance of massive colliding-wind binaries containing a Wolf-Rayet star as a potentially vital source of dust and chemical enrichment in the interstellar medium. Notably, the peculiarities of the dust's chemical composition and its enduring nature remain elusive.

Given WR 140's well-defined orbital period and predictable dust-emission events occurring every 7.93 years, it serves as an exemplary astrophysical laboratory for probing these questions. The chaotic environment surrounding the stars, particularly during their closest approach, produces chemically rich winds that compress gas and facilitate dust formation in discrete rings.

The JWST's recent investigations of WR 140 have yielded significant findings; the images captured demonstrate observable expansion of the dust rings within a mere span of 14 months, confirming their consistent outward motion. Such rapid changes in astronomical contexts are relatively rare, underscoring the importance of WR 140 as an active site of dust production.

In summation, while the eventual cessation of carbon-rich dust shell formation is inevitable for most Wolf-Rayet stars—many concluding their existence in spectacular supernovae or potentially collapsing into black holes—the JWST continues to illuminate the intricate processes governing cosmic dust dynamics in this remarkable natural laboratory.

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## Vocabulary List:



1. **Cosmic** /'kɒz.mɪk/ (adjective): Relating to the universe or cosmos especially as distinct from the earth.
2. **Obscuring** /əb'skjʊrɪŋ/ (verb): Making something unclear or difficult to perceive.
3. **Phenomena** /fɪ'nɒmɪnə/ (noun): Observable events or occurrences especially those of scientific interest.
4. **Sustenance** /'sʌstəns/ (noun): The maintaining of someone or something in a healthy or functional state.
5. **Dynamically** /daɪ'næmɪkli/ (adverb): In a way that is characterized by constant change activity or progress.
6. **Enrichment** /ɪn'rɪtʃmənt/ (noun): The act of making something richer or better often by adding nutrients or value.

## Vocabulary quizzes

### Multiple Choice ( Select the Correct answer for each question. )

1. What does proficiency refer to?

- Option: A. Skill or expertise in a particular area  
Option: B. A type of musical instrument  
Option: C. A form of transportation  
Option: D. A mathematical formula

2. What does morphological relate to?

- Option: A. Study of plants  
Option: B. Study of human behavior  
Option: C. Study of word structures  
Option: D. Study of historical events

### Gap-Fill ( Fill in the blanks with the correct word from the vocabulary list. )

3. Can you \_\_\_\_\_ the meaning of this complex passage?
4. \_\_\_\_\_ the negotiation process does not always lead to a better outcome.

### Matching Sentences ( Match each definition to the correct word from the vocabulary list. )

|                                                                                              |
|----------------------------------------------------------------------------------------------|
| 5. The decision to cut costs had serious financial for the company.                          |
| 6. The doctor diagnosed the patient with a rare medical that required specialized treatment. |

## Answer

**Multiple Choice:** 1. A. Skill or expertise in a particular area 2. C. Study of word structures

**Gap-Fill:** 3. Elucidate 4. Prolonging

**Matching sentence:** 1. Implications



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## 2. Syndrome

### CATEGORY

1. Sci/Tech - LEVEL5

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