## 2024 Ph H1 Q9

**Section:** Our Dynamic Universe
**Topic:** The Expanding Universe

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**Question:**
A student makes the following statements based on the spectral graph of stars W, X, Y, and Z:

I. Star Z is hotter than star W.
II. The peak frequency of radiation emitted is greatest for star W.
III. Star Y emits more energy per second per unit area than star X.

Which of the statements is/are correct?

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**Evaluation:**

- ✅ **I:** True – Star Z peaks at a **shorter wavelength** than W → it is **hotter**
- ❌ **II:** False – Star **W** peaks at the **longest wavelength** → **lowest** frequency
- ✅ **III:** True – Star Y has a **higher peak** than X → emits more energy per second per unit area

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**Correct Answer:**

$D$

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**Revision Tips:**

- **Wien's Law:** $\lambda_{\max} \propto \frac{1}{T}$ — shorter peak wavelength = hotter
- Peak **frequency** is highest for shortest **wavelength**, not longest
- Peak **height** (not width) = more energy emitted per unit area per second
- Be careful reading graphs — common traps lie in frequency vs wavelength!