2023 Ph H1 Q9

Section: Our Dynamic Universe
Topic: The Expanding Universe

A student makes three statements about radiation from stellar objects:

I. The peak wavelength of emitted radiation is longer for hotter objects than for cooler objects.
II. A ‘blue’ star is likely to be hotter than a ‘red’ star.
III. The radiation emitted per unit surface area per unit time is greater for hotter objects.

Which of these are correct?

A. I only
B. II only
C. III only
D. I and III only
E. II and III only

Evaluation:

- ❌ **I:** False – **hotter** objects emit **shorter** wavelength radiation (Wien’s Law)
- ✅ **II:** True – blue stars are hotter than red ones
- ✅ **III:** True – hotter stars emit more radiation per m² per s (Stefan–Boltzmann Law)

Answer:

E

Revision Tips:

- **Wien’s Law:** $\lambda_{\max} \propto \frac{1}{T}$
- **Blue** = short wavelength = high temperature
- **Stefan–Boltzmann Law:**
$P = \sigma A T^4$ — hotter stars emit more energy
- Misstatements about wavelength often trip students up — read carefully!