

# Yıldızların Yapısı ve Evrimi

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Temel Yıldız Parametreleri

# Yıldızların Parlaklıkları

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$$F = \frac{L}{4\pi d^2} \quad m = -2.5 \log_{10} F + \text{Sabit}$$

$$m_1 - m_2 = -2.5 \log_{10} \left( \frac{F_1}{F_2} \right)$$

$$m_{bol} = -2.5 \log_{10} \left( \frac{L_{bol}}{4\pi d^2} \right) = -2.5 \log_{10} L_{bol} + 5 \log_{10} d + \text{Sabit}$$

$$M_{bol} = -2.5 \log_{10} L_{bol} + 5 \log_{10} 10 + \text{Sabit} = -2.5 \log_{10} L_{bol} + 5 + \text{Sabit}$$

$$m - M = 5 \log_{10} d - 5$$

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# Salt Parlaklık

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$$m - M = 5 \log \left( \frac{\tau}{10 \text{ pc}} \right) \quad D = d \tau$$

$$m - M = 5 \log \left( \frac{\tau}{10 \text{ pc}} \right) + A_{\tau}$$

$$\begin{aligned} m_2 - m_1 &= 2.5 \log I_1 / I_2 = 2.5 \log (d / 10 \text{ pc})^2 \\ &= 5.0 \log (d / 10 \text{ pc}) \end{aligned}$$

$$m - M = 5 \log (d / 10 \text{ pc}) = \text{DM}$$

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# Renk Ölçeği

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$$(B-V)_{göz} = M_B - M_V + A_B - A_V$$

$$(B-V)_{göz} = (B-V)_0 + E_{B-V}$$

$R_V$  toplam soğurmanın seçici soğurmaya oranı nasıl bulunur?

$$R_V \equiv \frac{A_V}{E_{B-V}} = \frac{A_V}{A_B - A_V} \approx 3.2$$

$$CI = B-V = -0.865 + 8540 / T \quad (4000 \text{ K} < T < 10000 \text{ K})$$

$$L = 4\pi * R^2 * \sigma T^4$$

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# Bolometrik Düzeltme

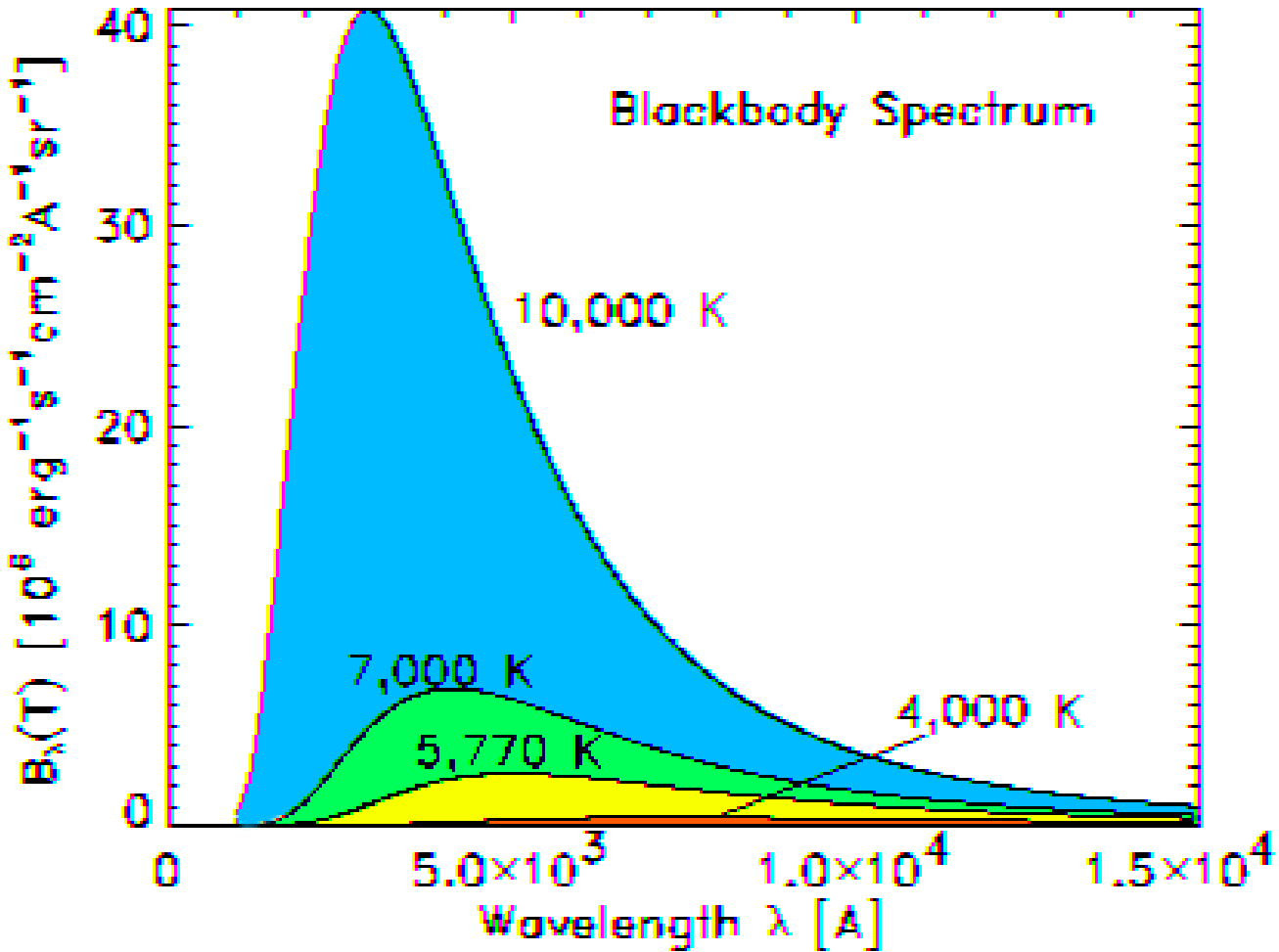
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$$BC = m_{\text{bol}} - V = M_{\text{bol}} - M_V$$

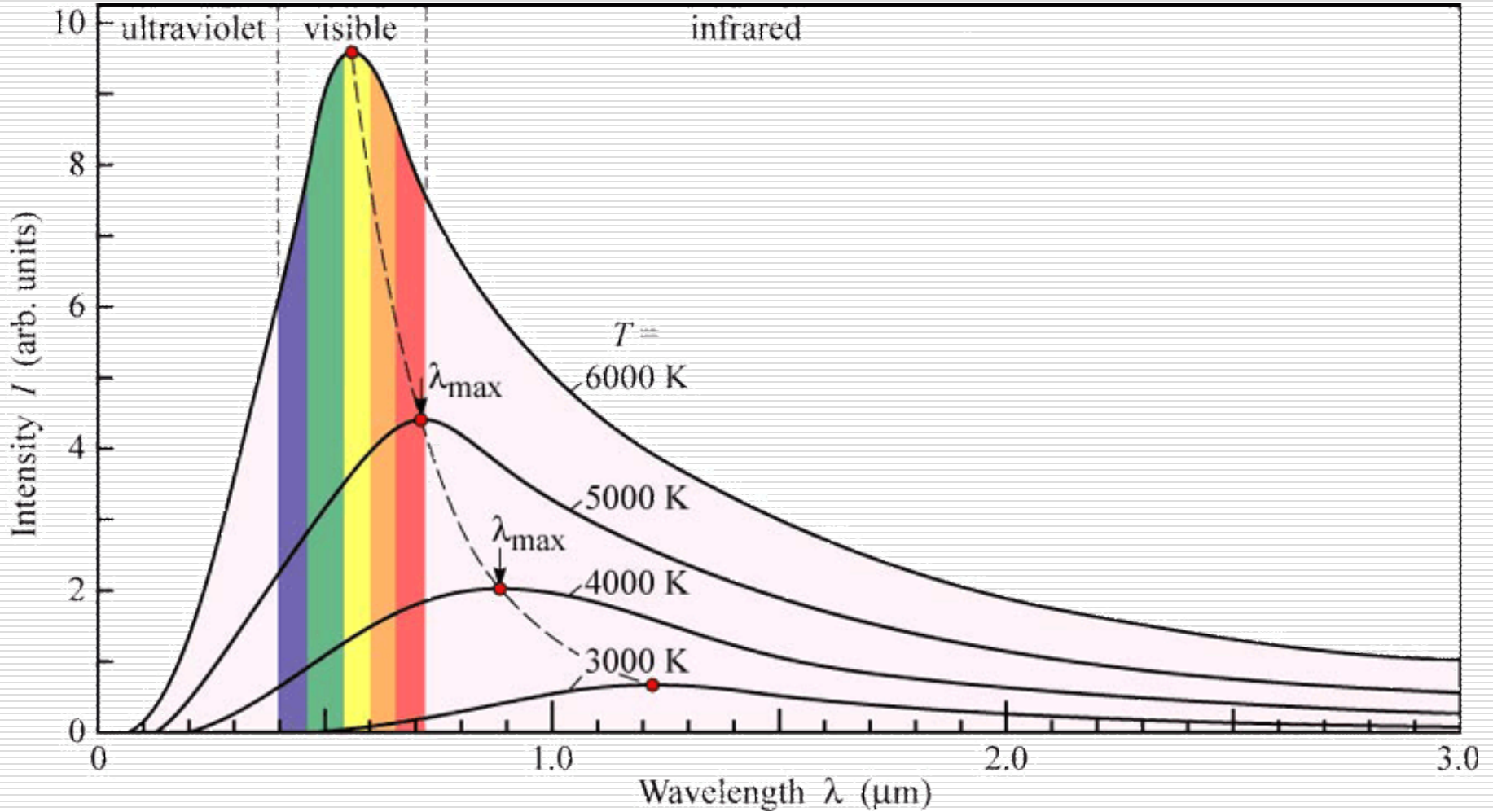
$$M_{\text{bol}} = M_V - BC$$

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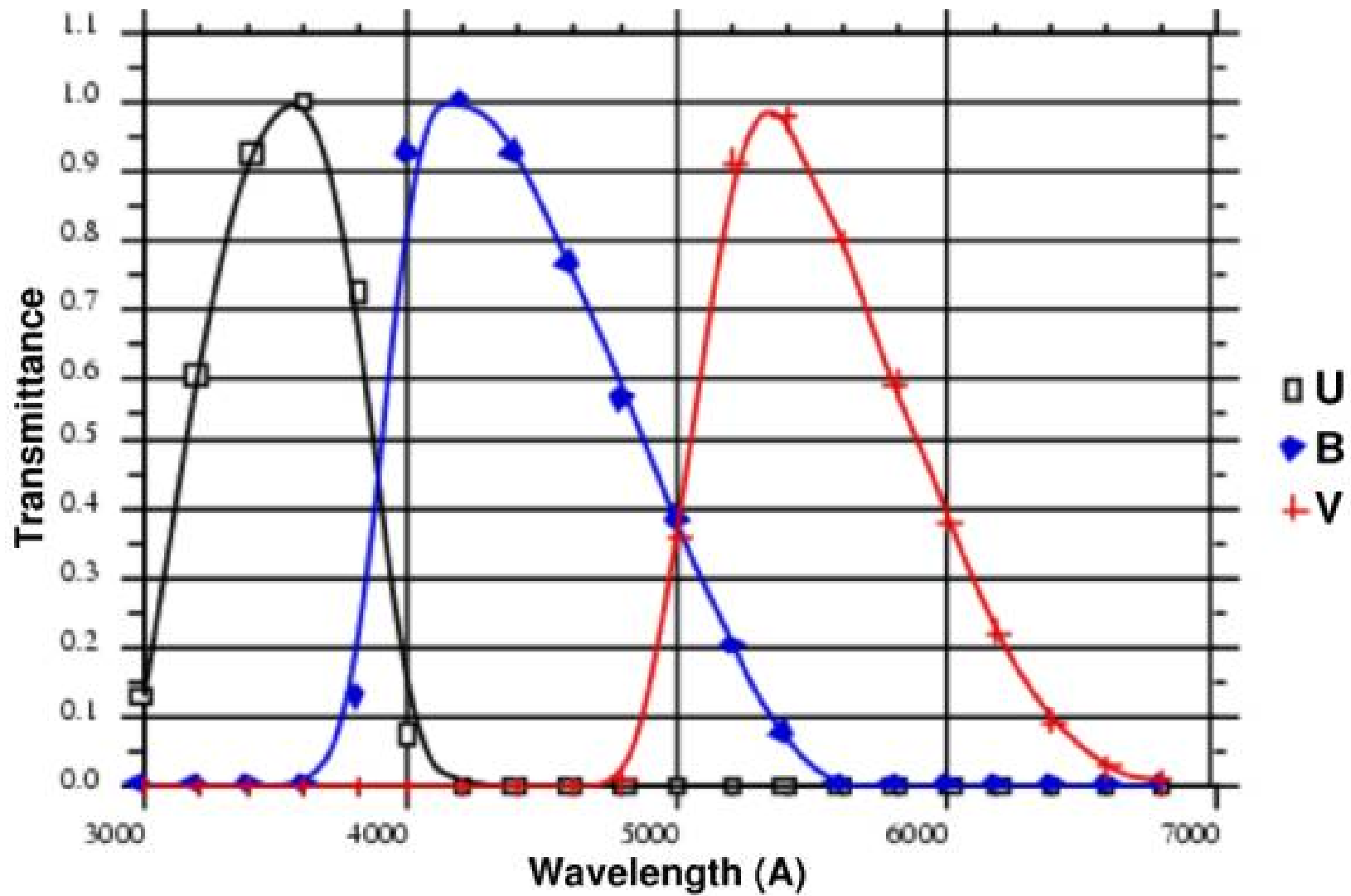
# Karacisim Işınımı



# Karacisim Işınımı

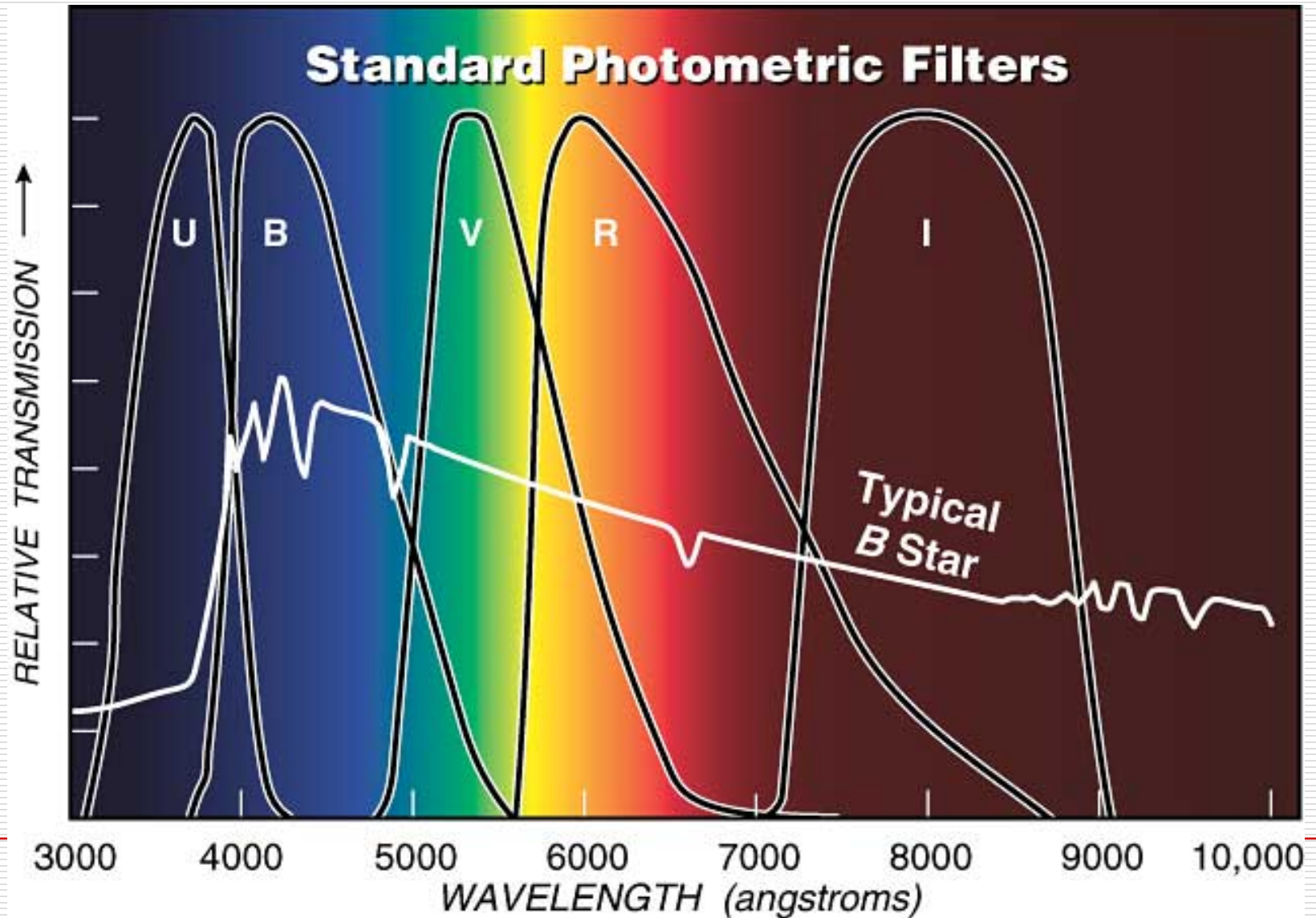


# Fotometrik Sistem



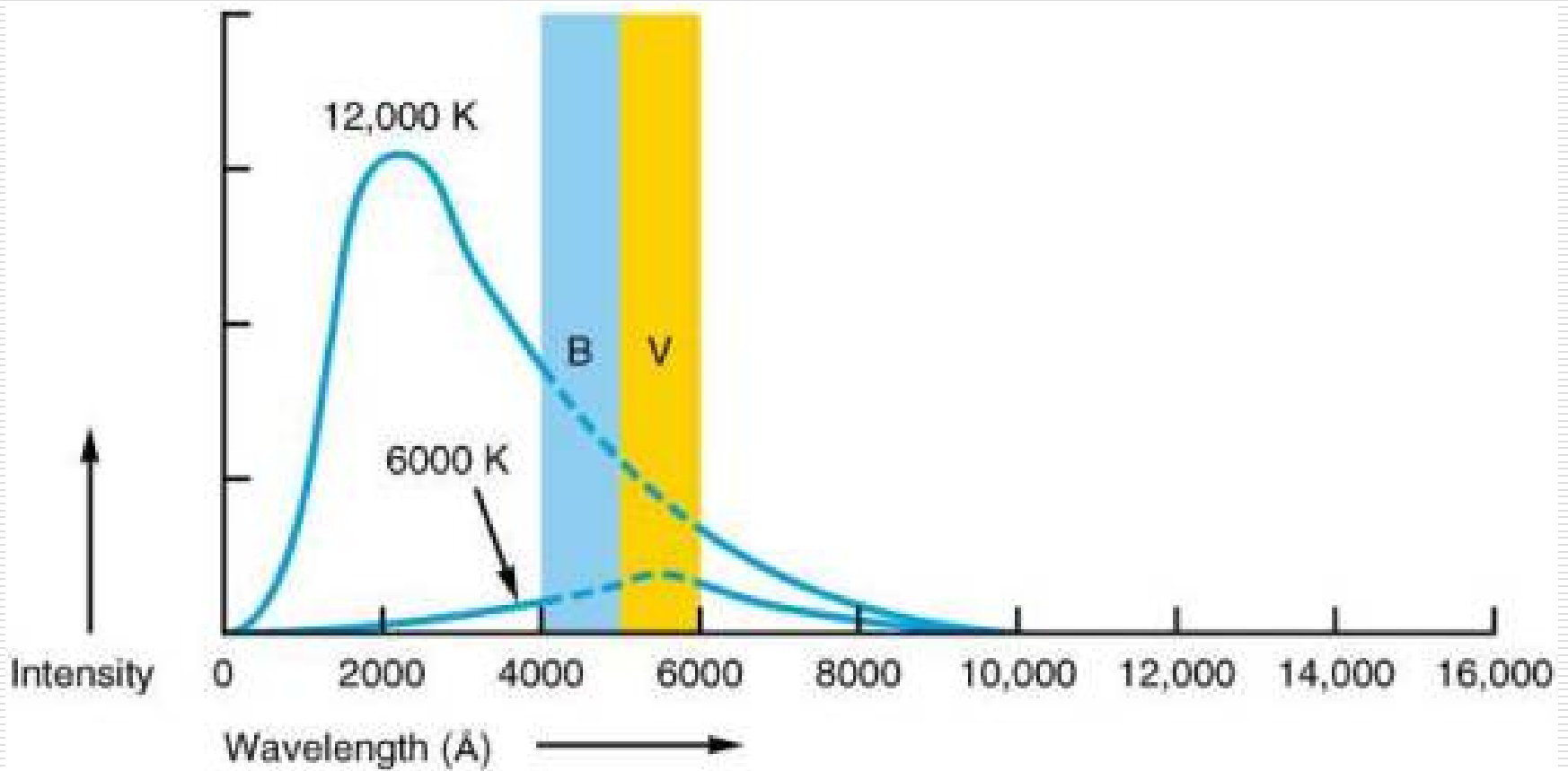


# Fotometrik Sistem

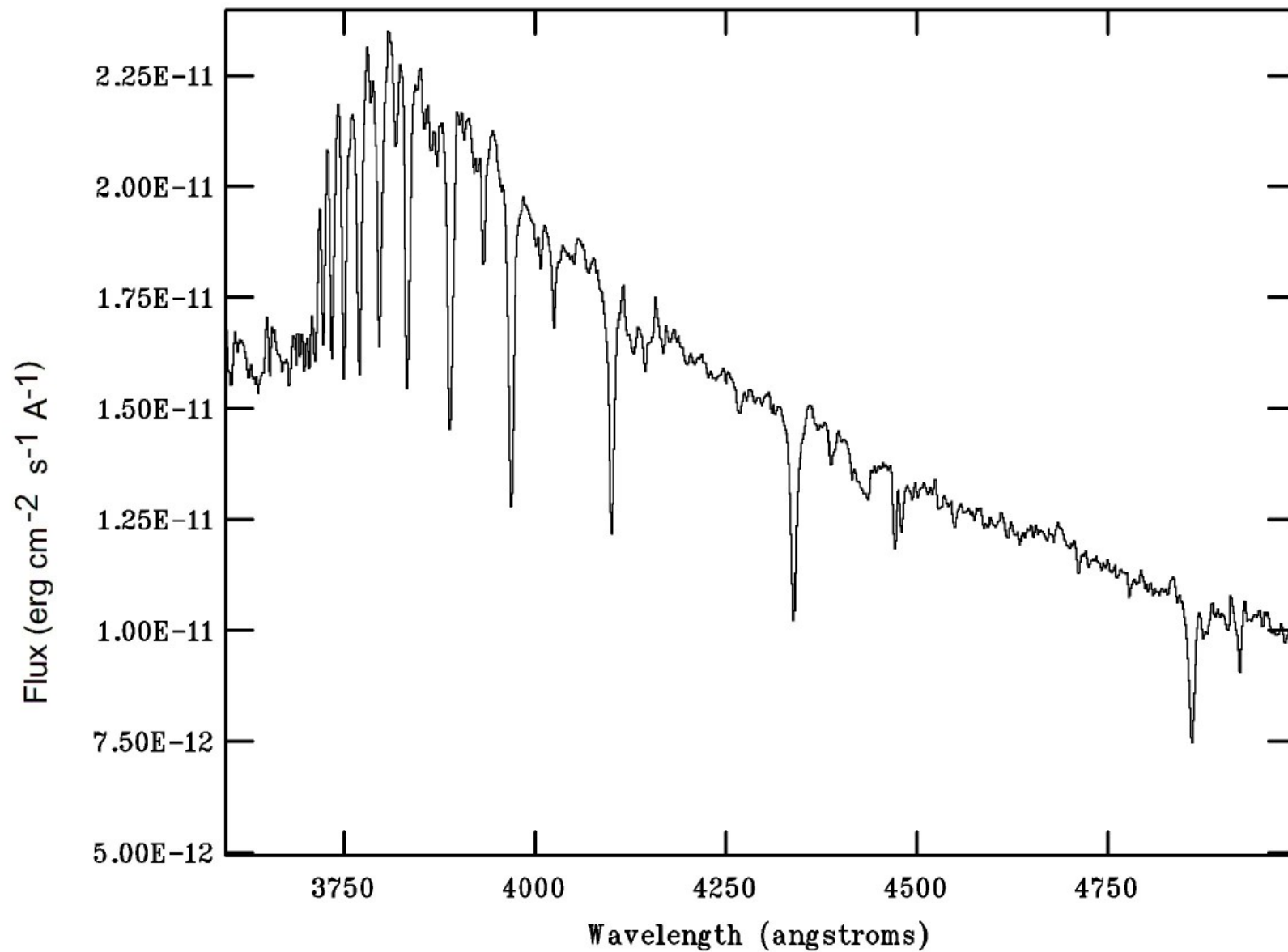


# Renk Ölçeği

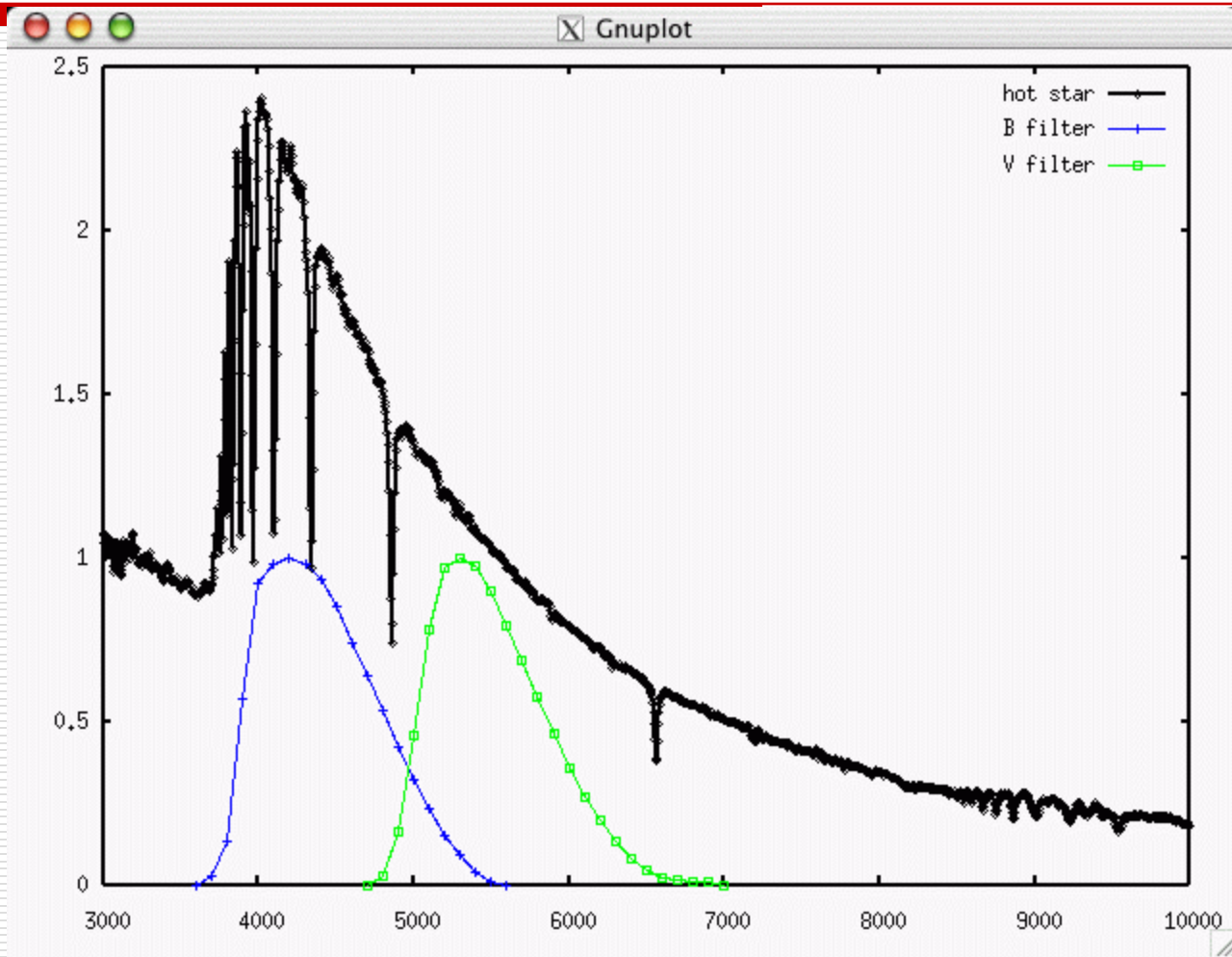
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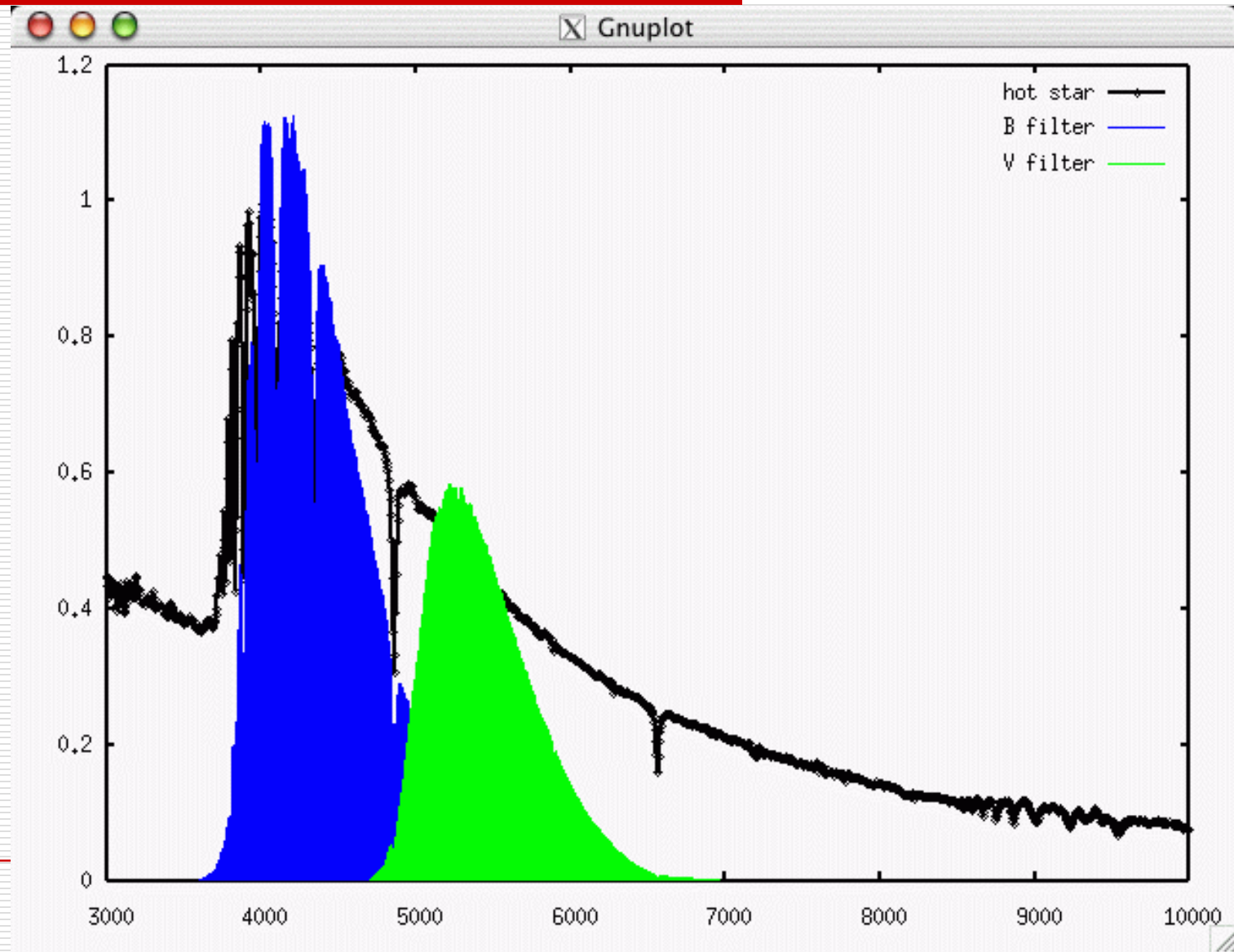
# HD 20899

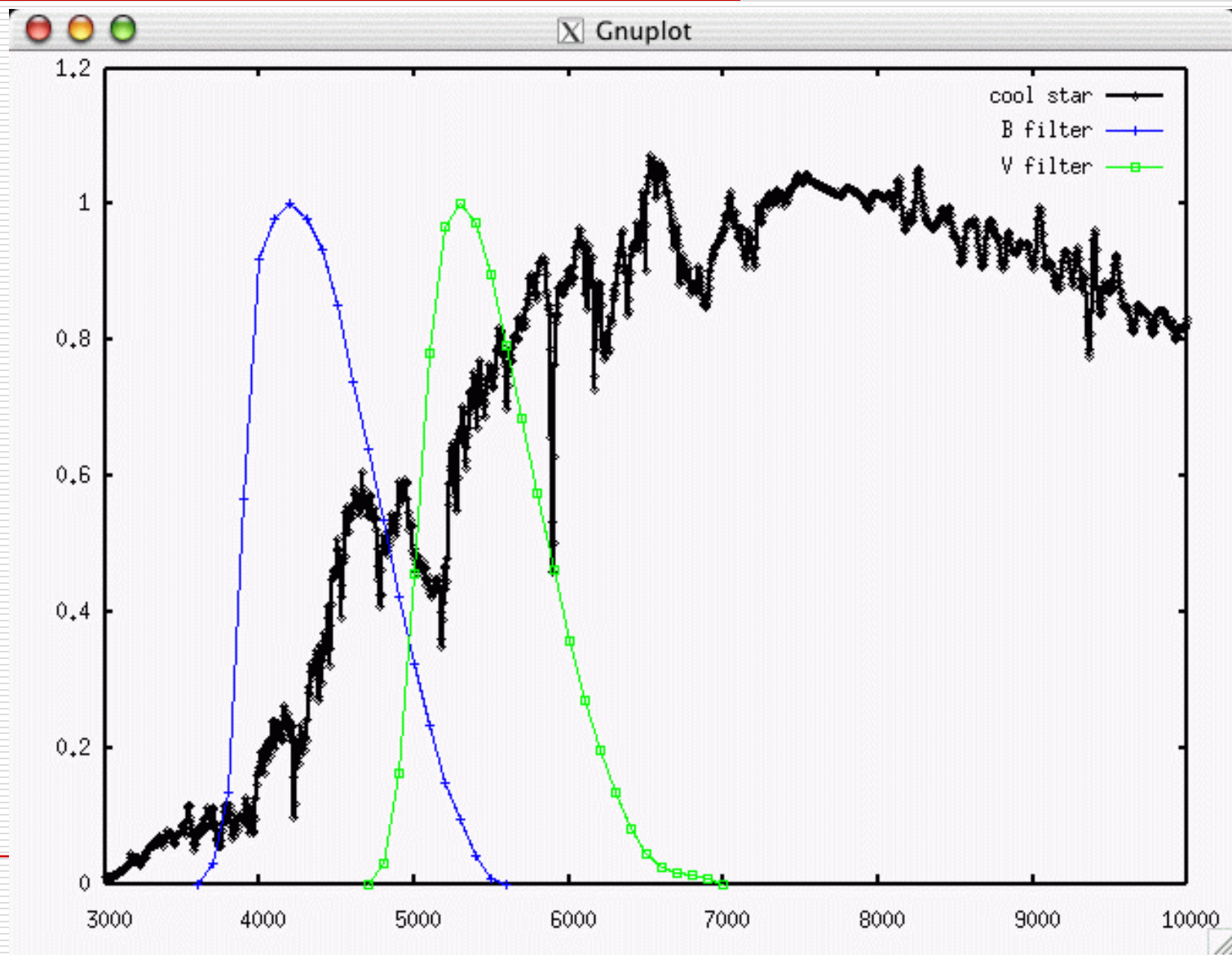


# Yıldızların Tayfı



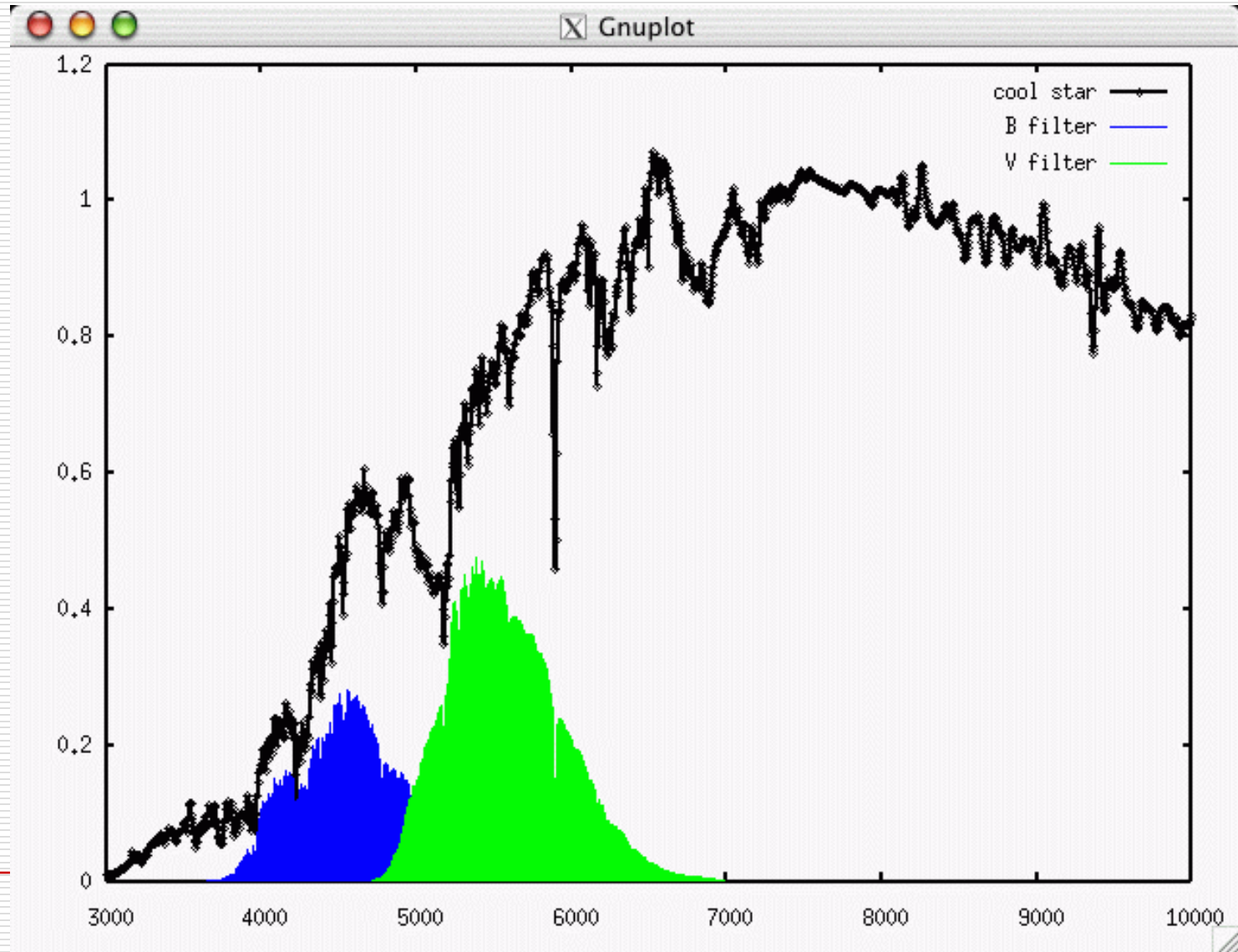
# Yıldızların Tayfı



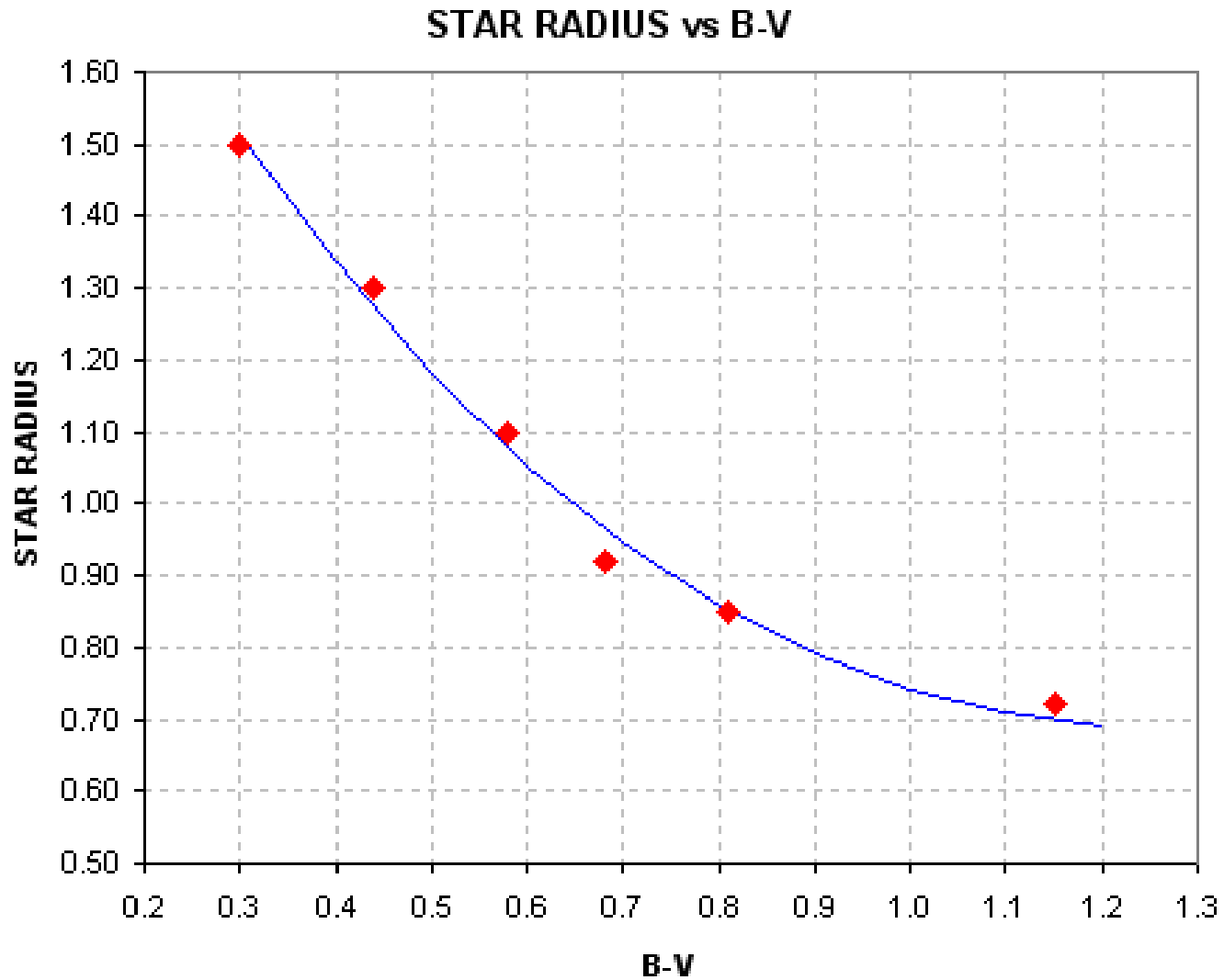




# Renk Ölçeği

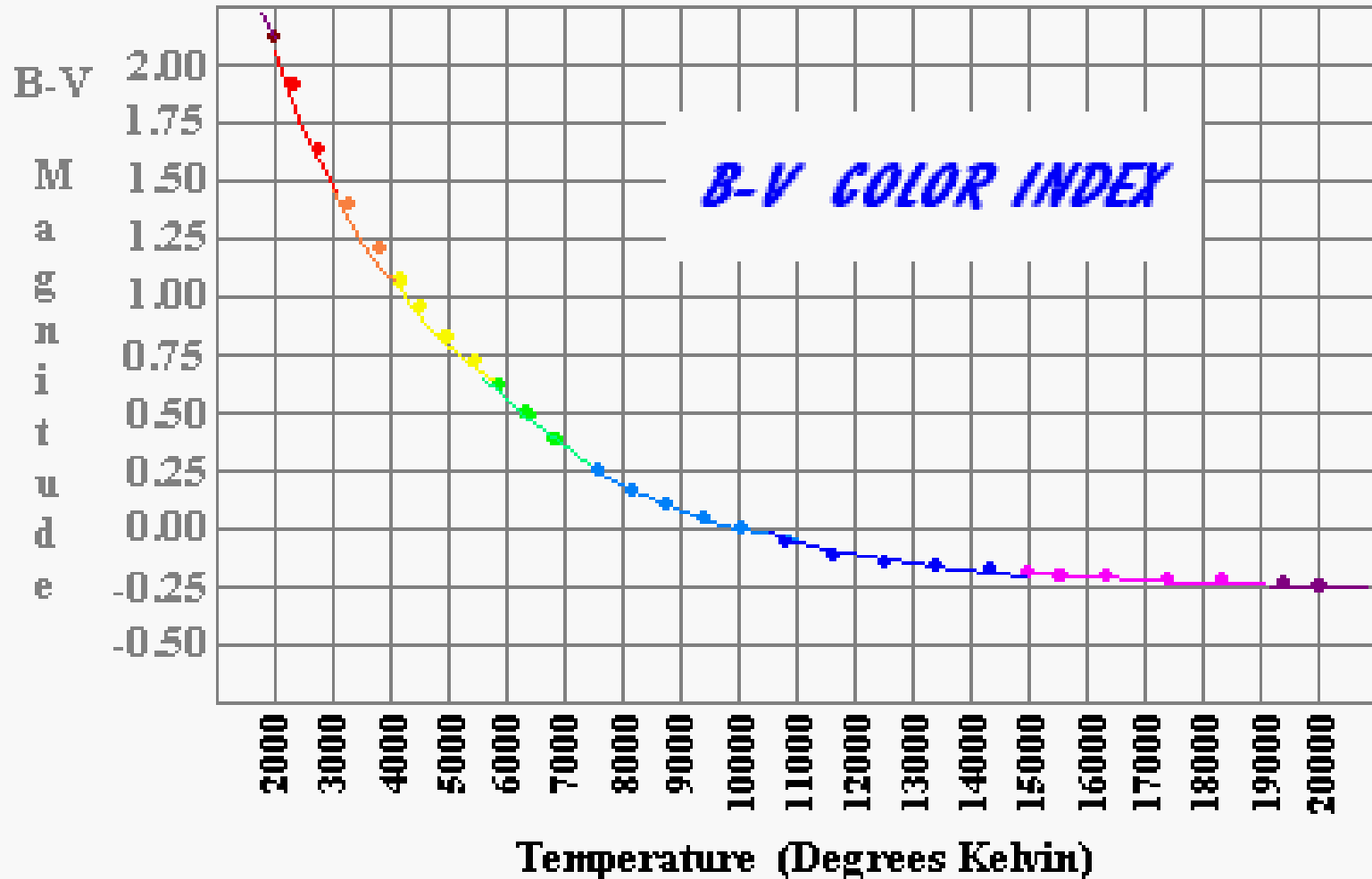


# Renk Ölçeği ve Yarıçap

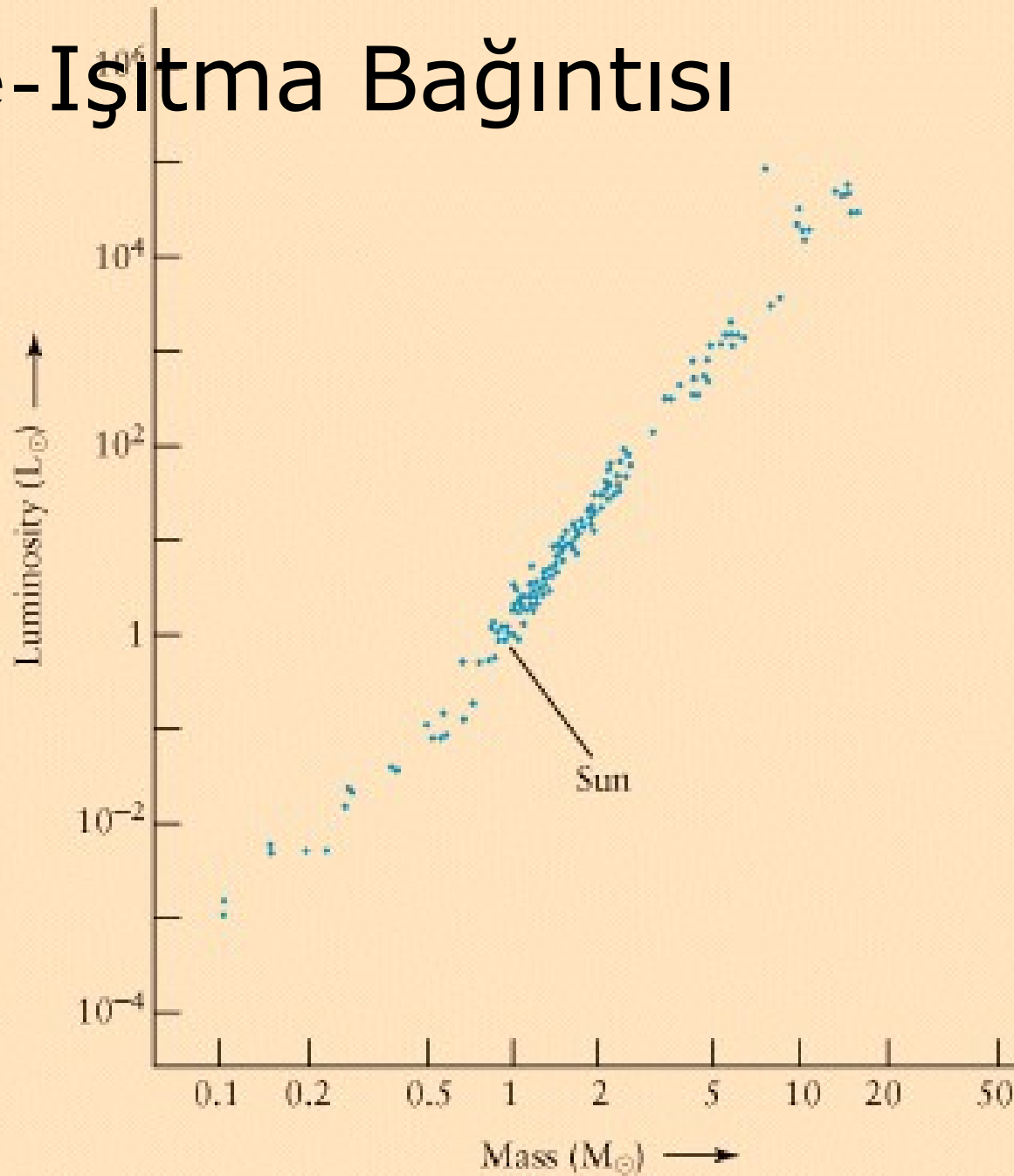




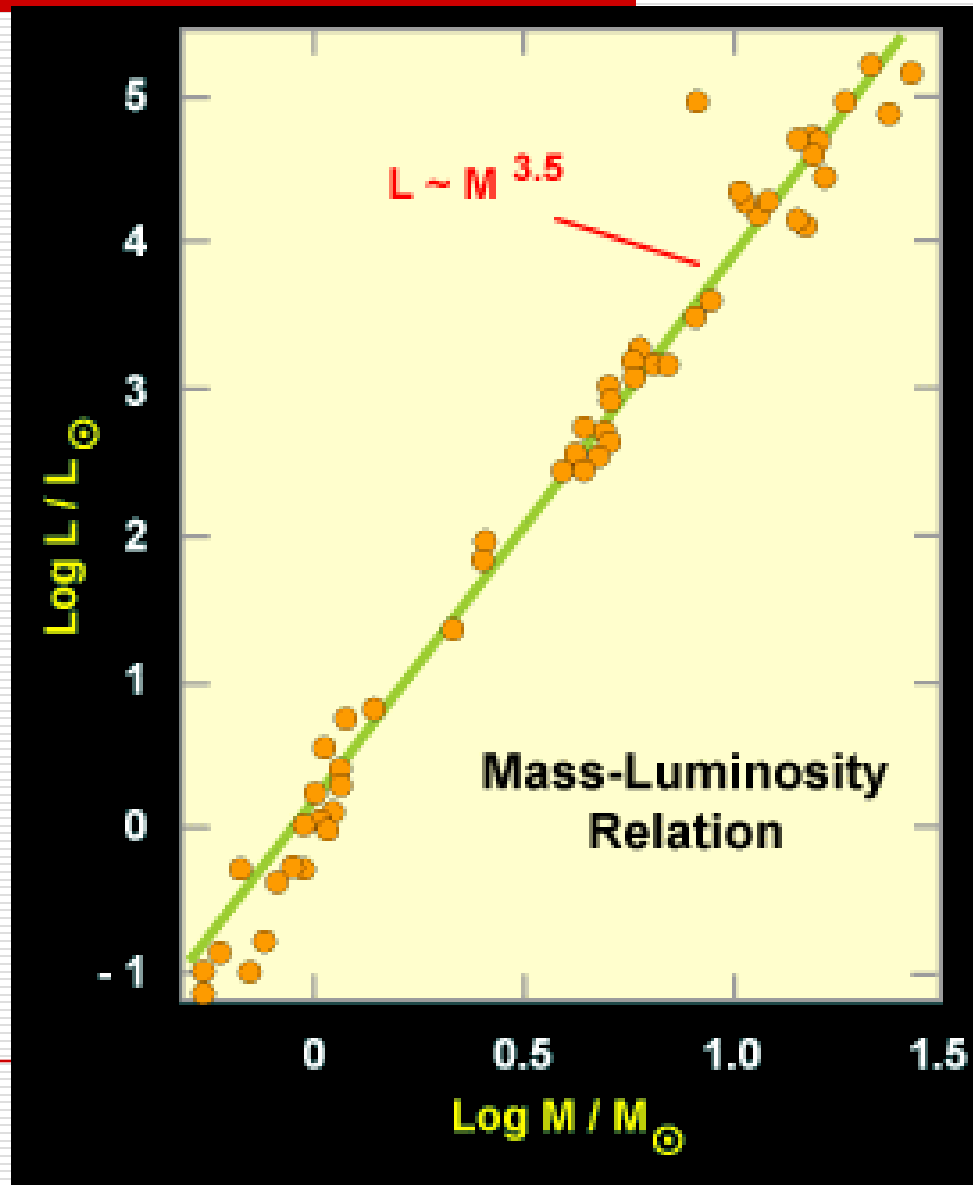
# Renk Ölçeği ve Sıcaklık



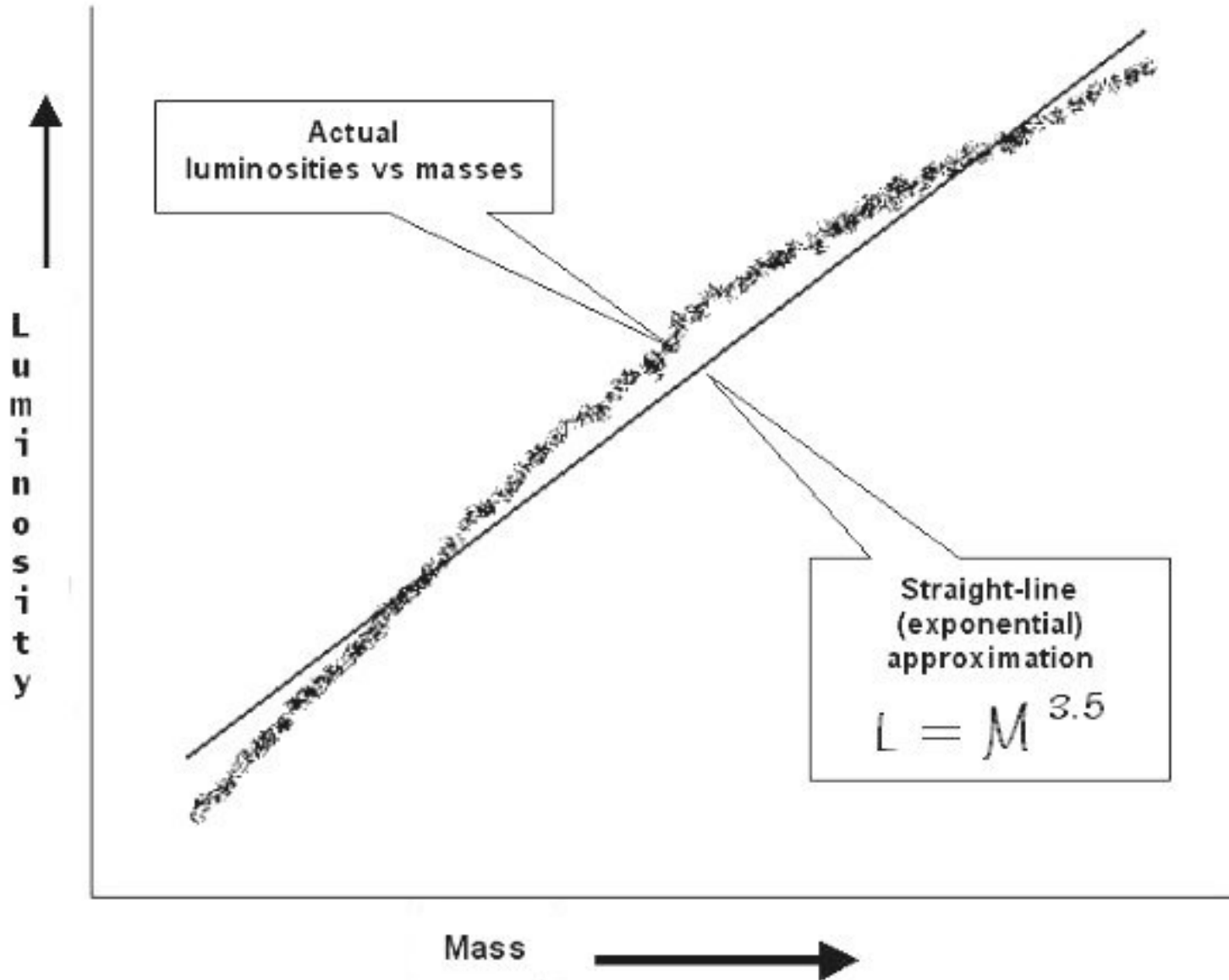
# Kütle-Işıltma Bağintısı



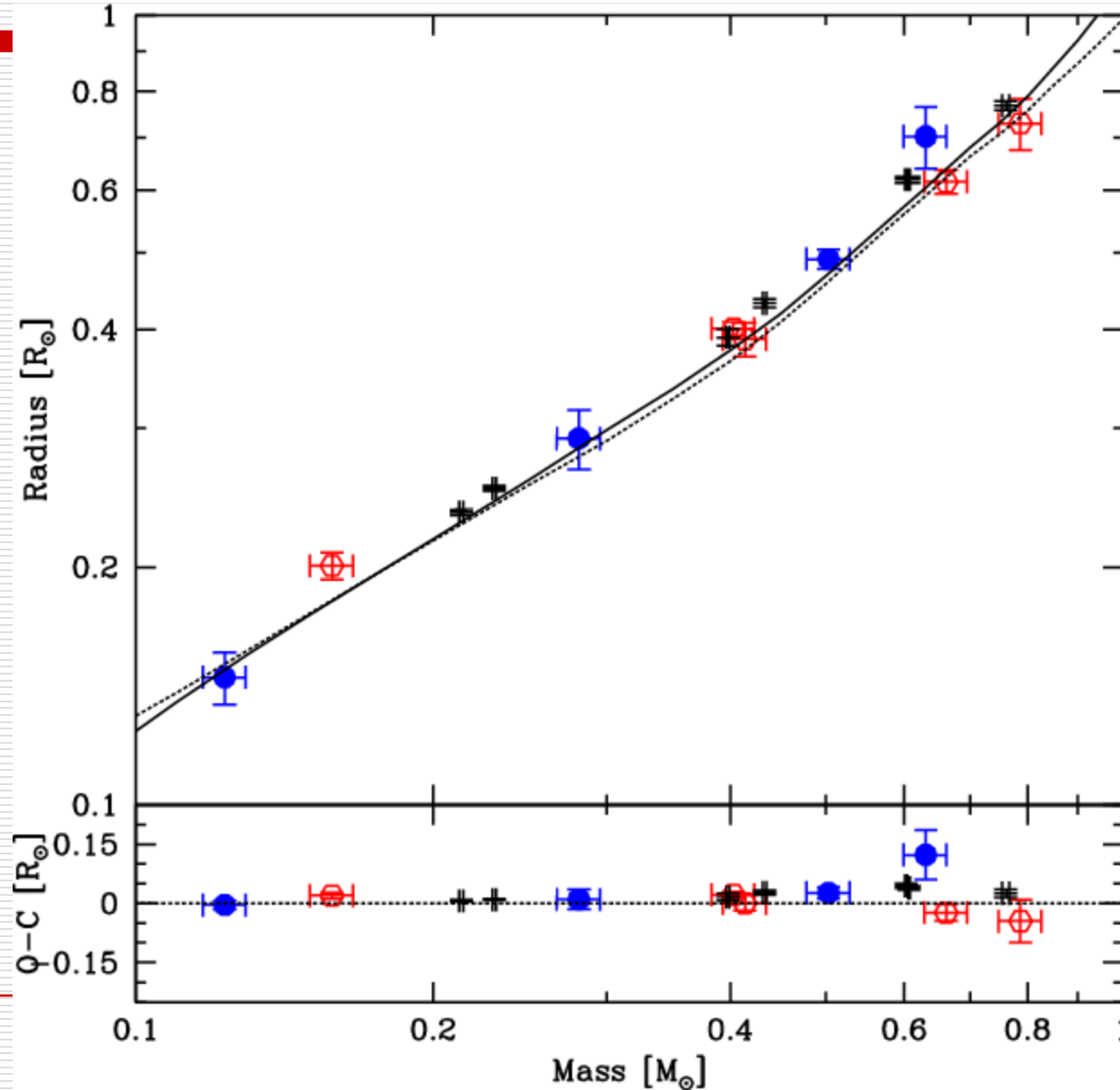
# Kütle-Işıltma Bağintısı



# Kütle-Işıltma Bağintısı

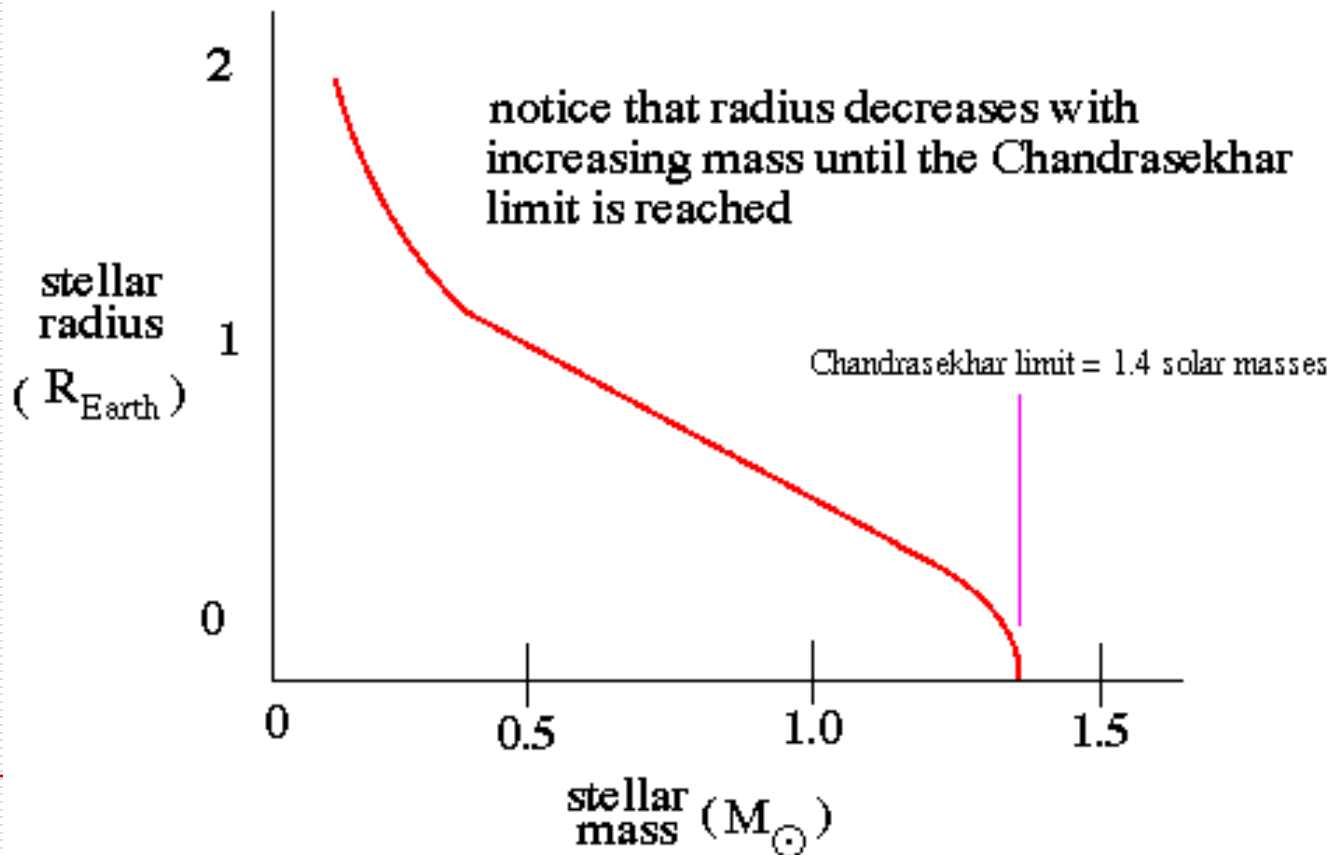


# Kütle-Yarıçap Bağıntısı



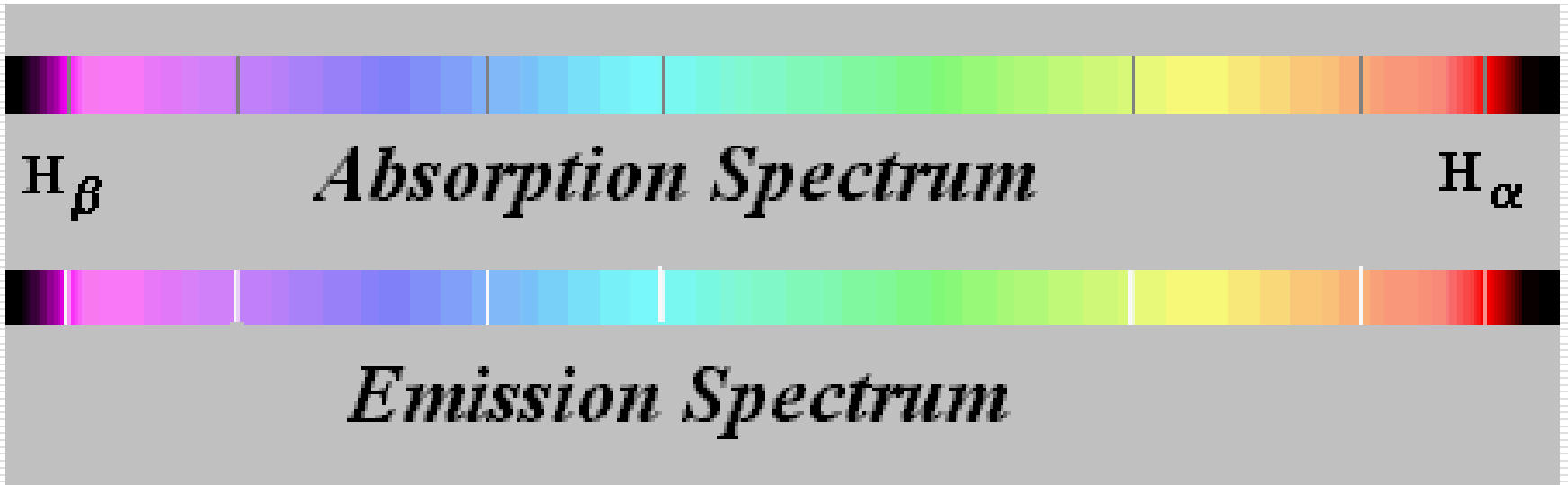
# Kütle-Yarıçap Bağintısı

## Mass-Radius Relation for White Dwarfs



# Yıldızların Tayfı

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# Yıldızların Tayfı

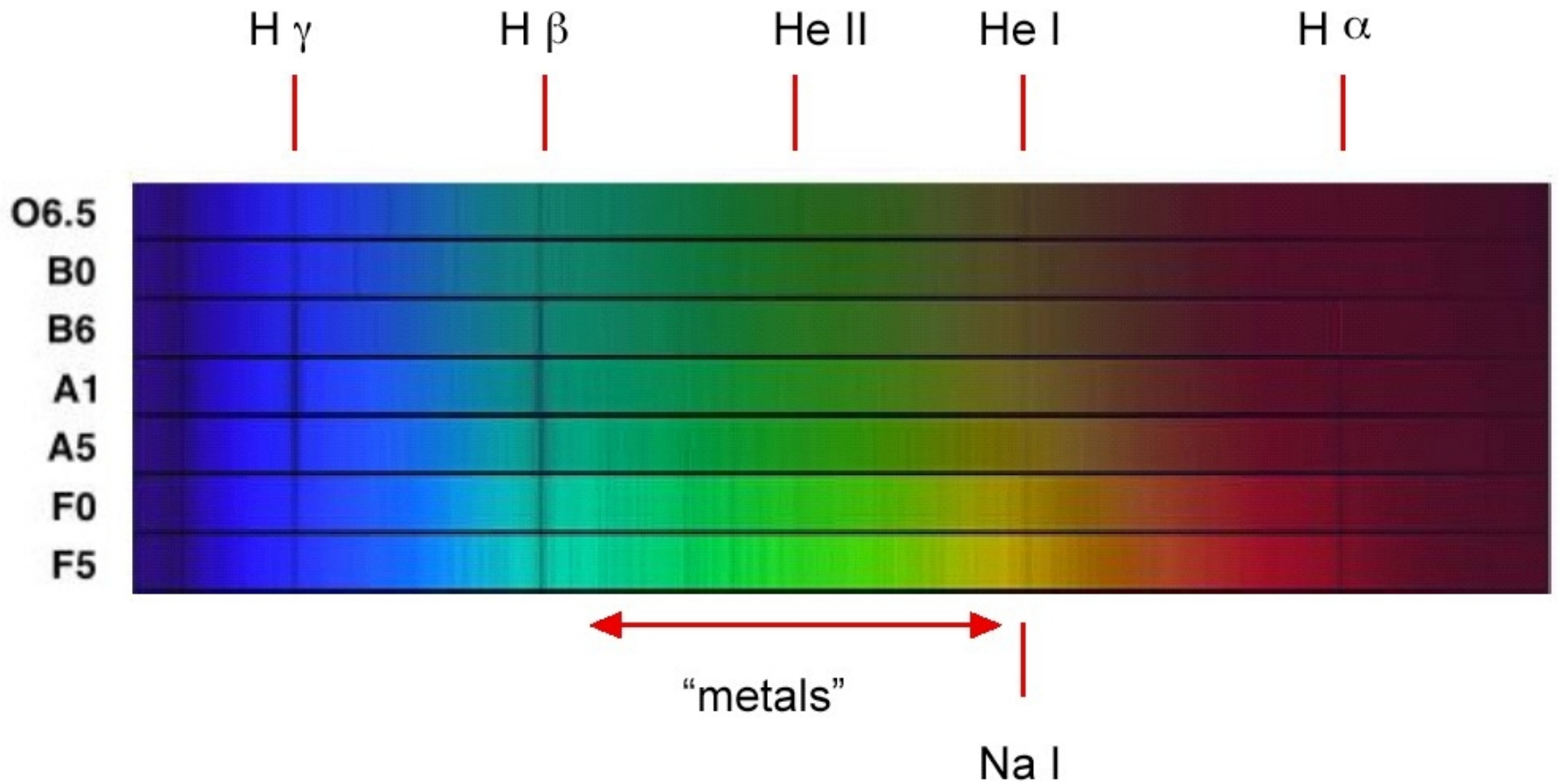
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O5
O7
O8
O9.5
B1.5
B4
A1
A2
A5
A7
F0
F5
F7
F8
G0
G3
G7
K0
M0



# Yıldızların Tayfı

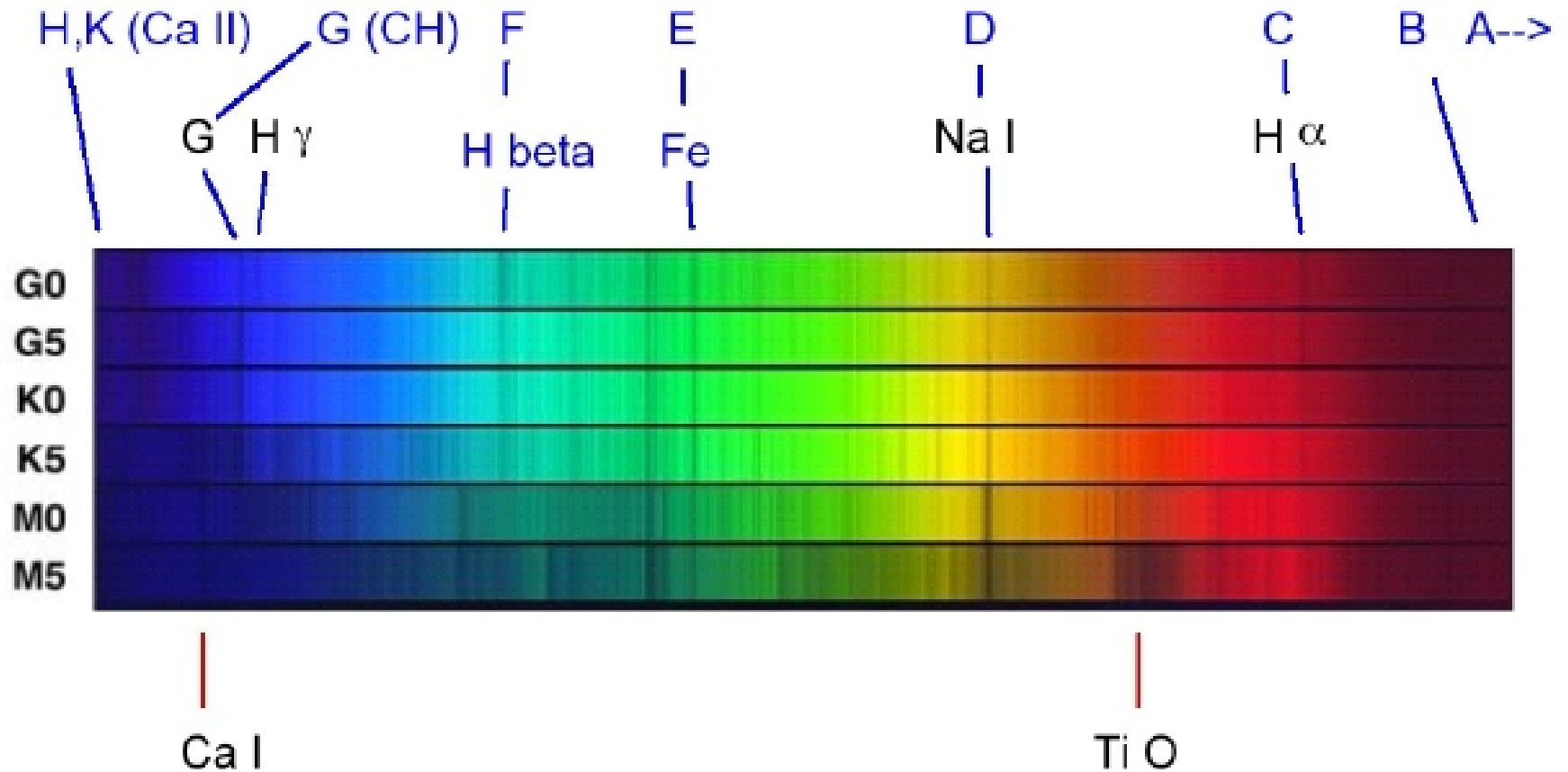
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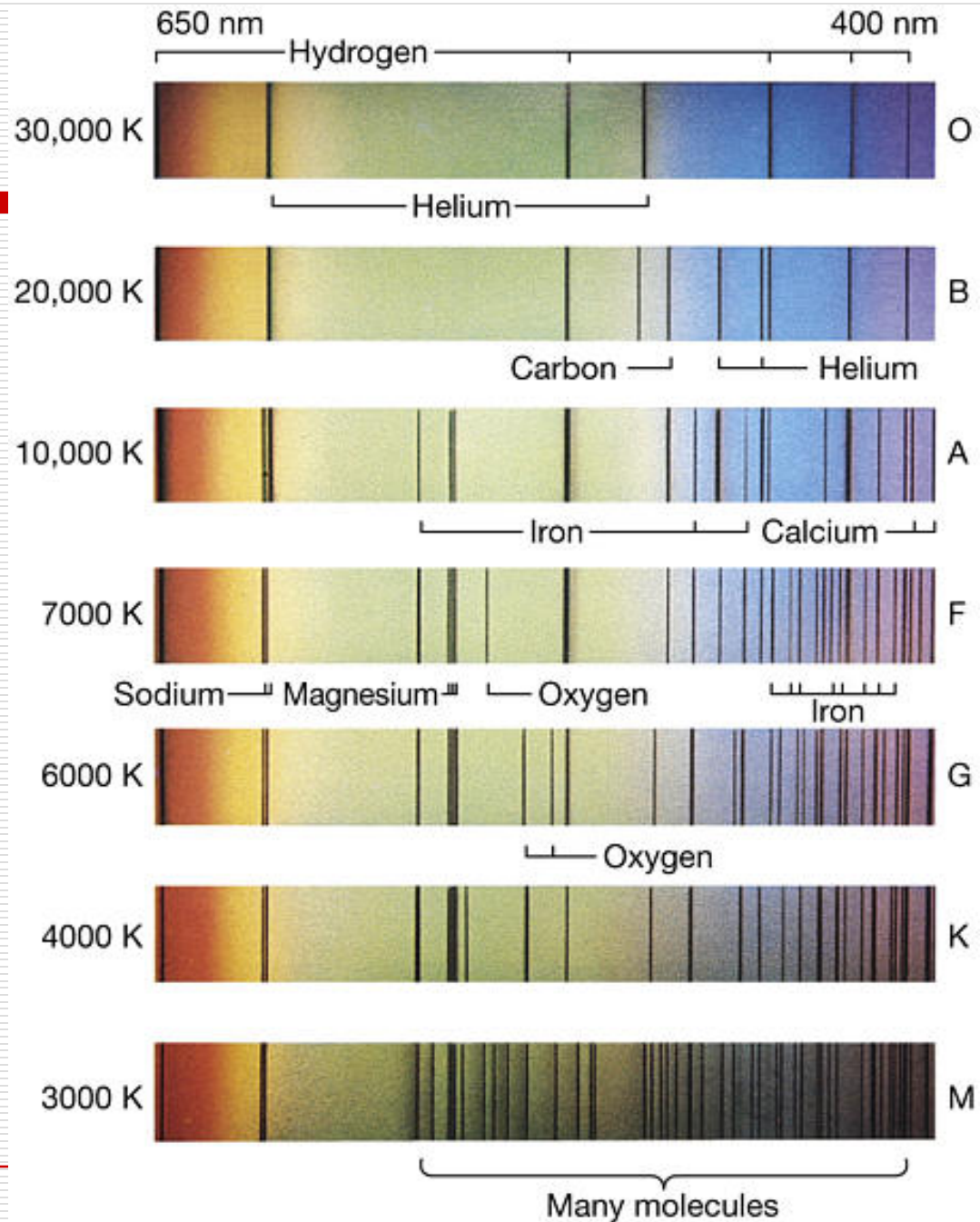
# Yıldızların Tayfı

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## Fraunhofer Lines

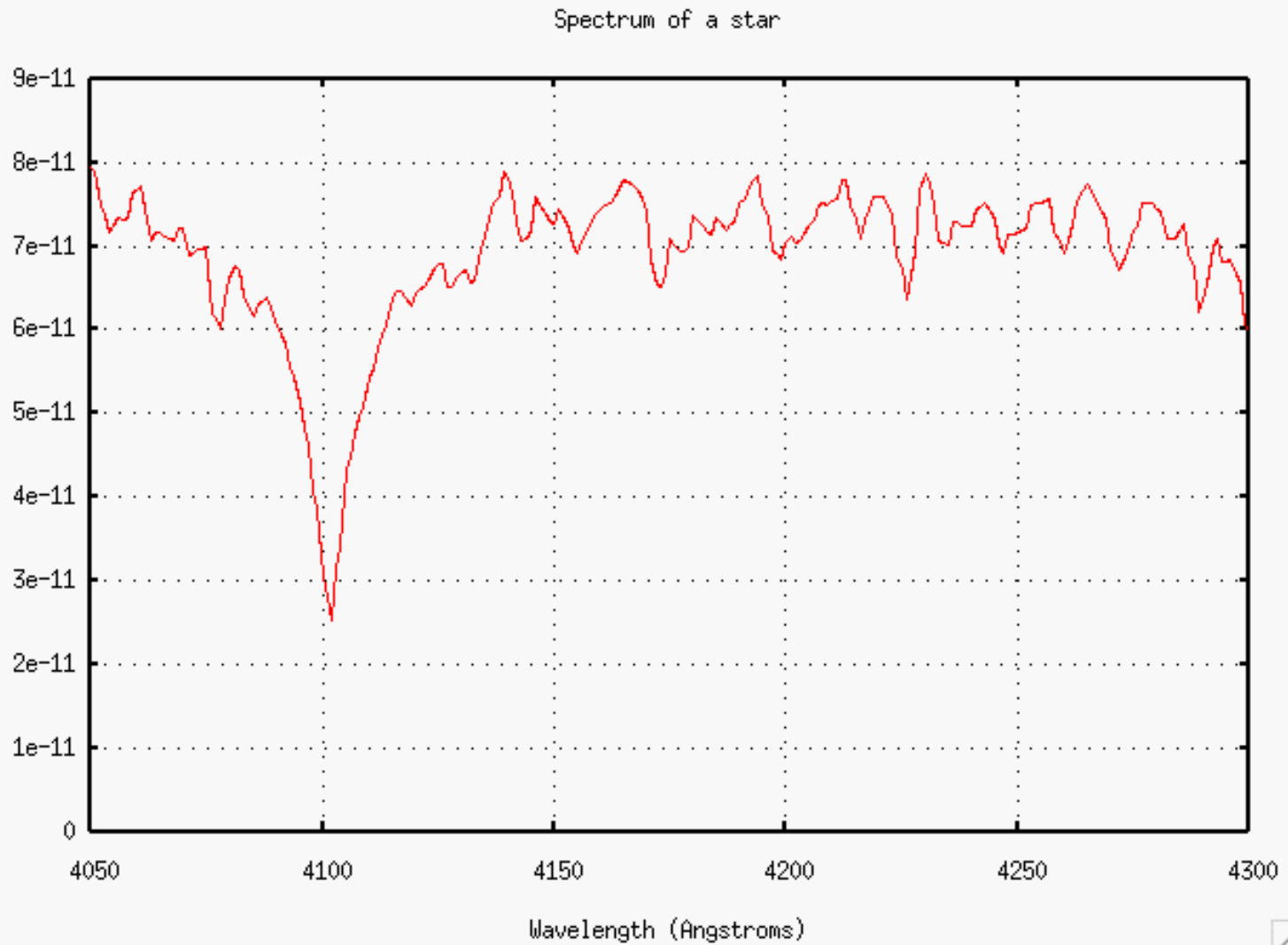


# Yıldızların Tayfı

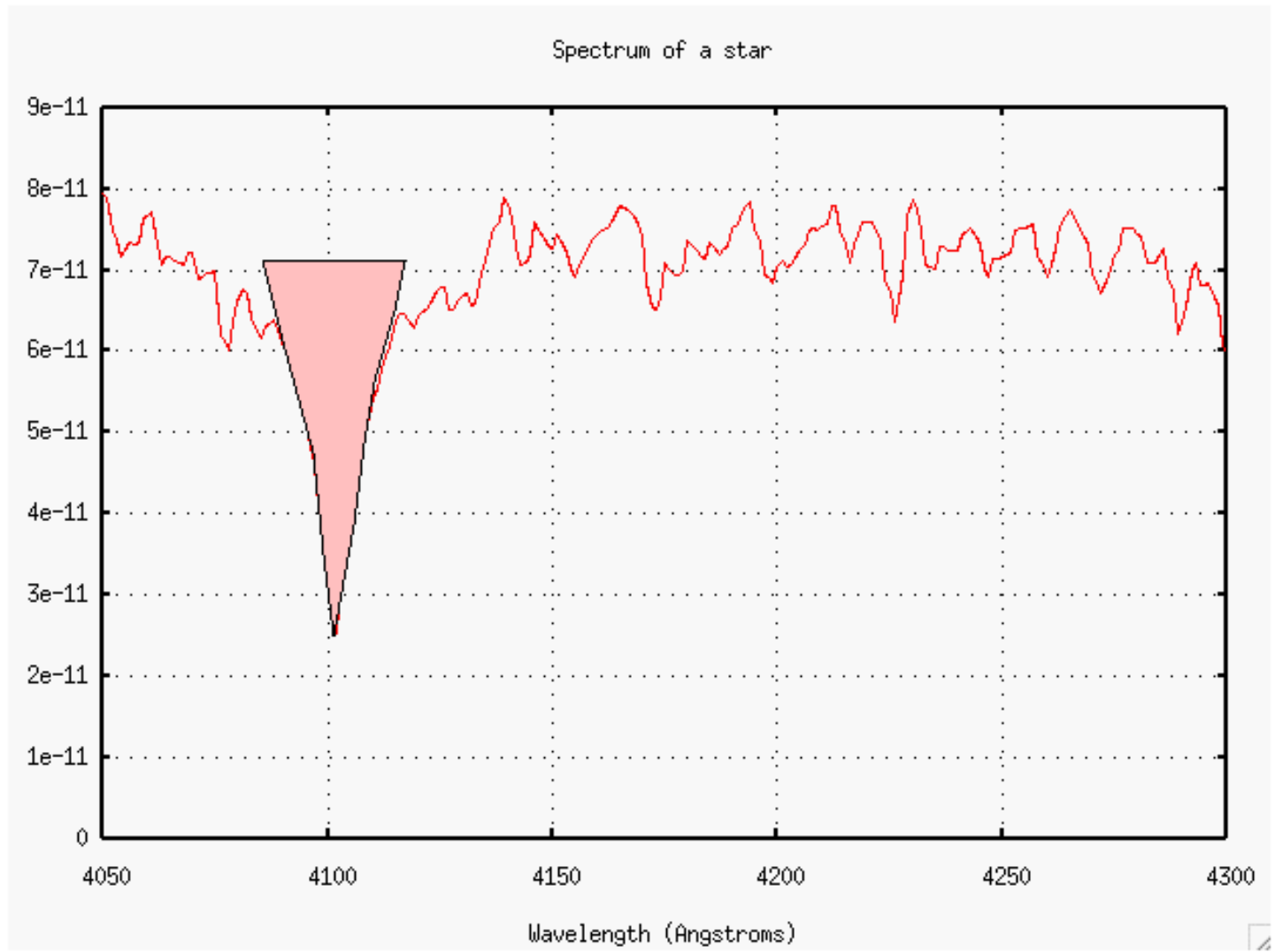


# Yıldızların Tayfı

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# Yıldızların Tayfı, Eşdeğer Genişlik



# Yıldızların Tayfı, Eşdeğer Genişlik



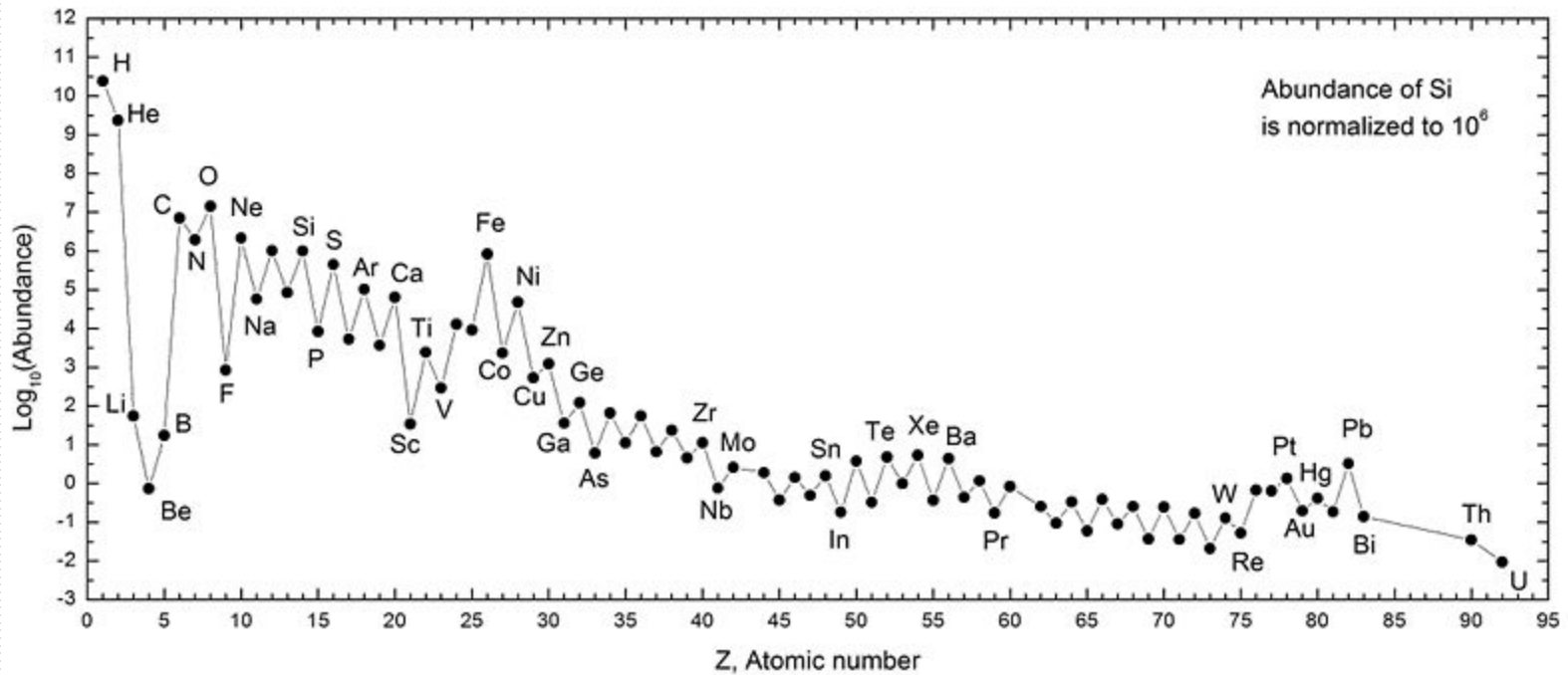
# Yıldızların Kimyasal Yapısı

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Element	Bolluk (Toplam Atom sayısının yüzdesi)	Bolluk (Toplam Kütlenin yüzdesi)
Hidrojen	91.2	71.0
Helyum	8.7	27.1
Oksijen	0.078	0.97
Karbon	0.043	0.40
Azot	0.0088	0.096
Silikon	0.0045	0.099
Magnezyum	0.0038	0.076
Neon	0.0035	0.058
Demir	0.030	0.014
Kükürt	0.015	0.040

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# Güneşin Kimyasal Bolluğu





# Yıldızlararası Ortam

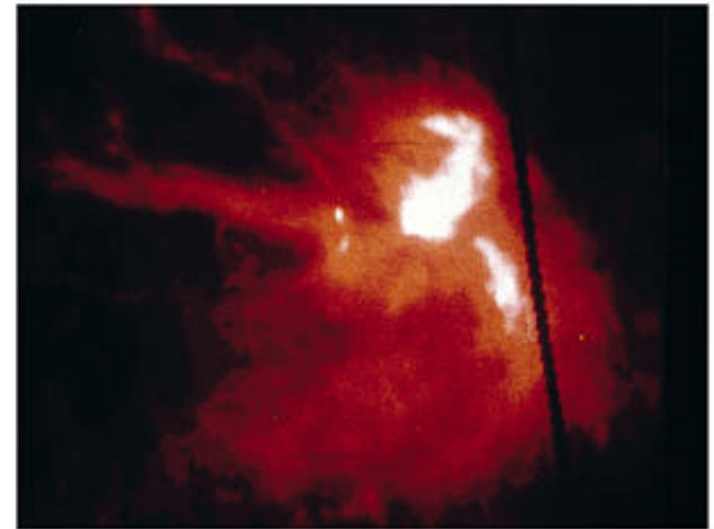
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(a) |← 1 pc →|



(b)



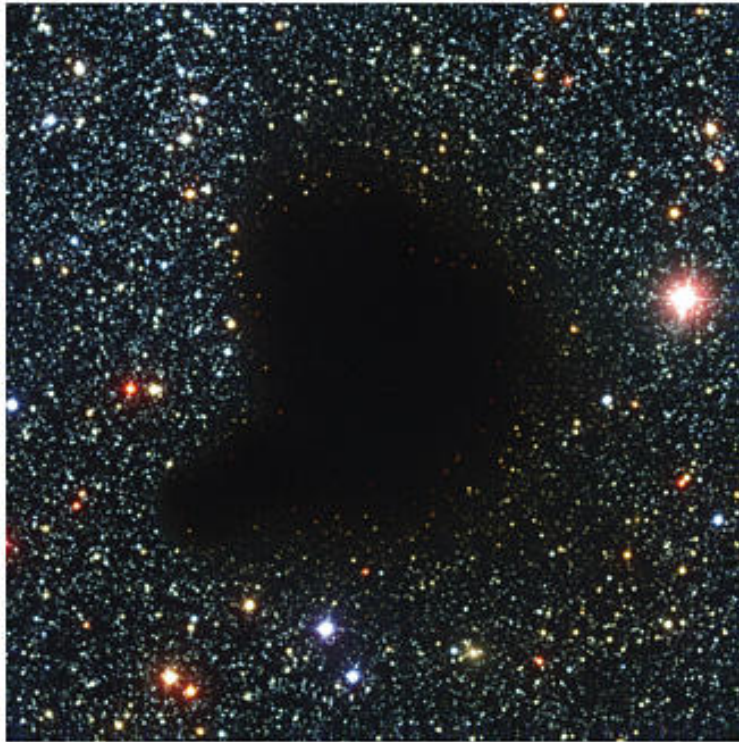
(c)



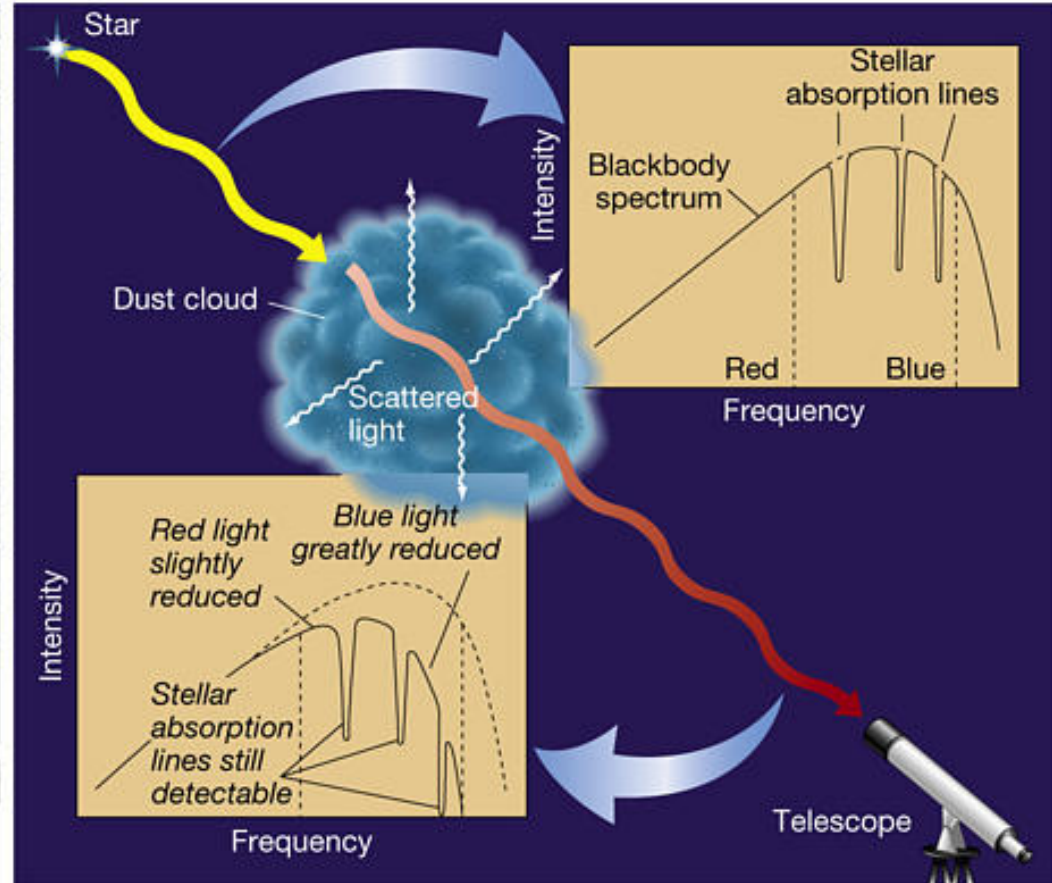
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# Yıldızlararası Ortam



(a)



(b)

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# Sıcaklık ve Renkleri

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Tür	Sıcaklık	Yıldızın Rengi
O	30,000 - 60,000 °K	Mavi
B	10,000 - 30,000 °K	Mavi
A	7,500 - 10,000 °K	Beyaz
F	6,000 - 7,500 °K	Beyaz (Sarımsı)
G	5,000 - 6,000 °K	Sarı (Güneş Renginde)
K	3,500 - 5,000 °K	Portakal Rengi
M	2,000 - 3,500 °K	Kırmızı

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# Tayf Türü

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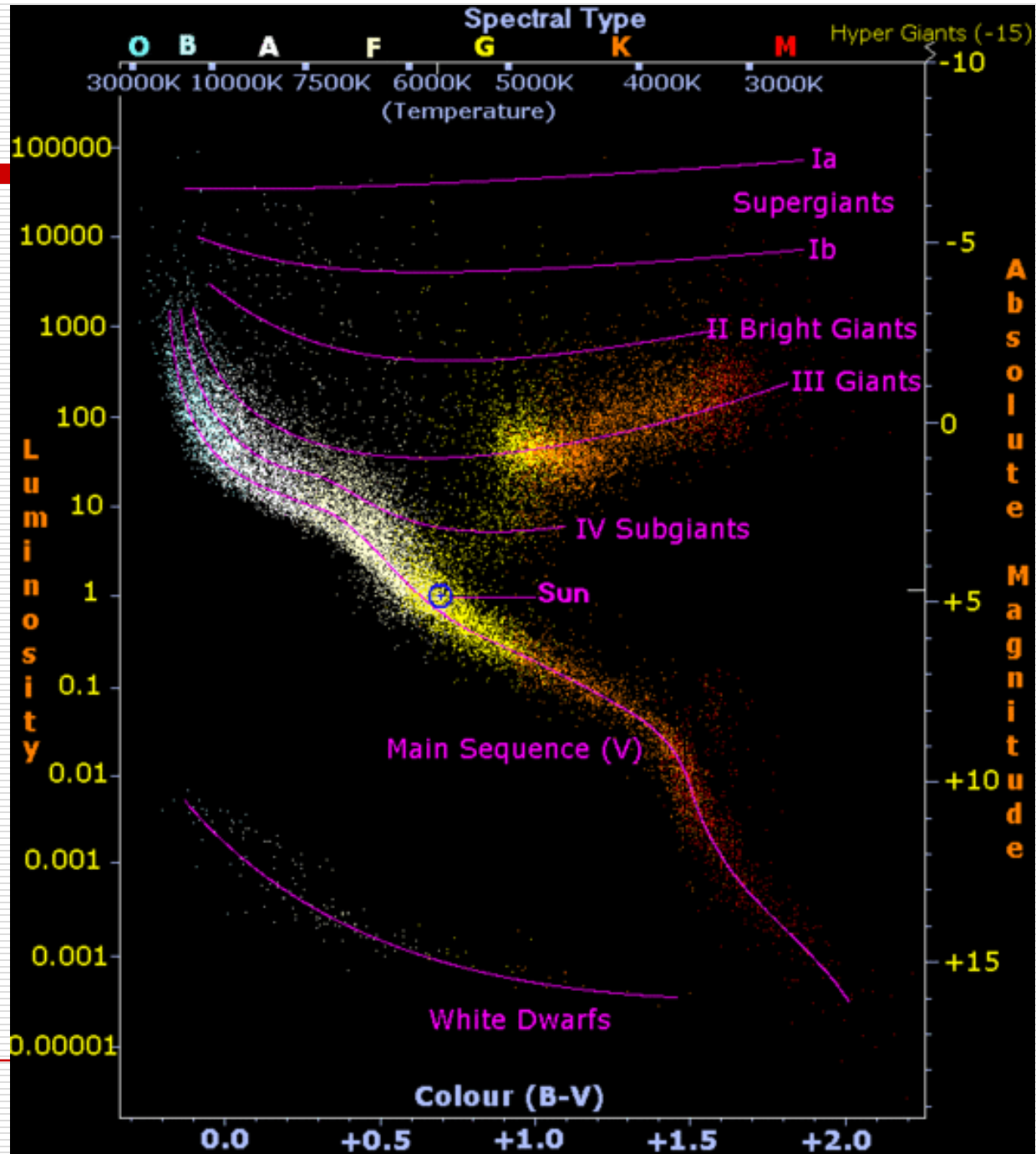
## Tür

## Yıldız Türü

Ia-O	Extreme, luminous supergiants
Ia	Luminous supergiants
Ib	Less luminous supergiants
II	Bright giants
III	Normal giants
IV	Subgiants
V	Main-sequence (dwarf) stars
VI	Subdwarfs
D	White dwarfs

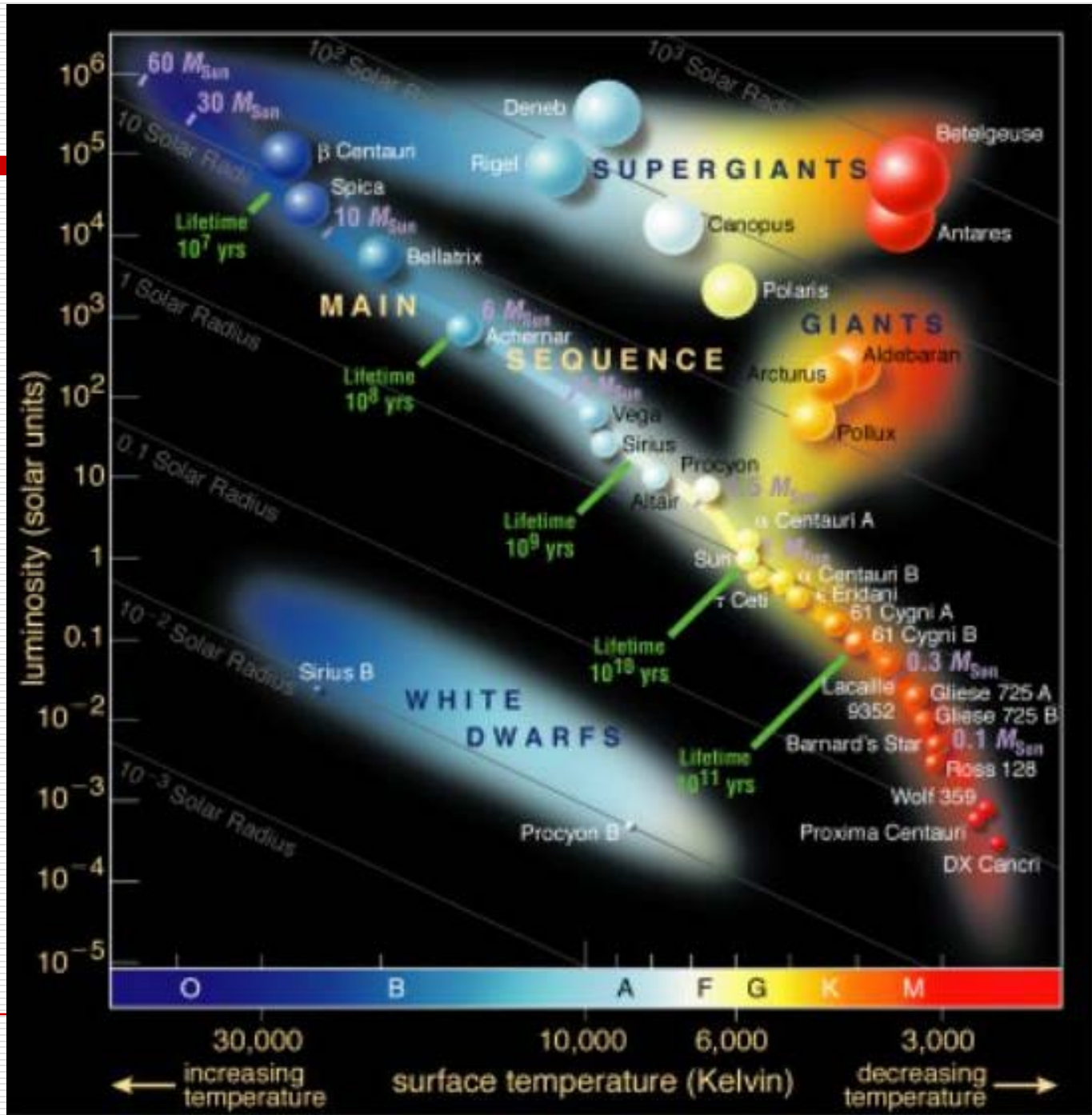
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Hipparcos  
100  
parsek  
içinde  
22000  
yıldız

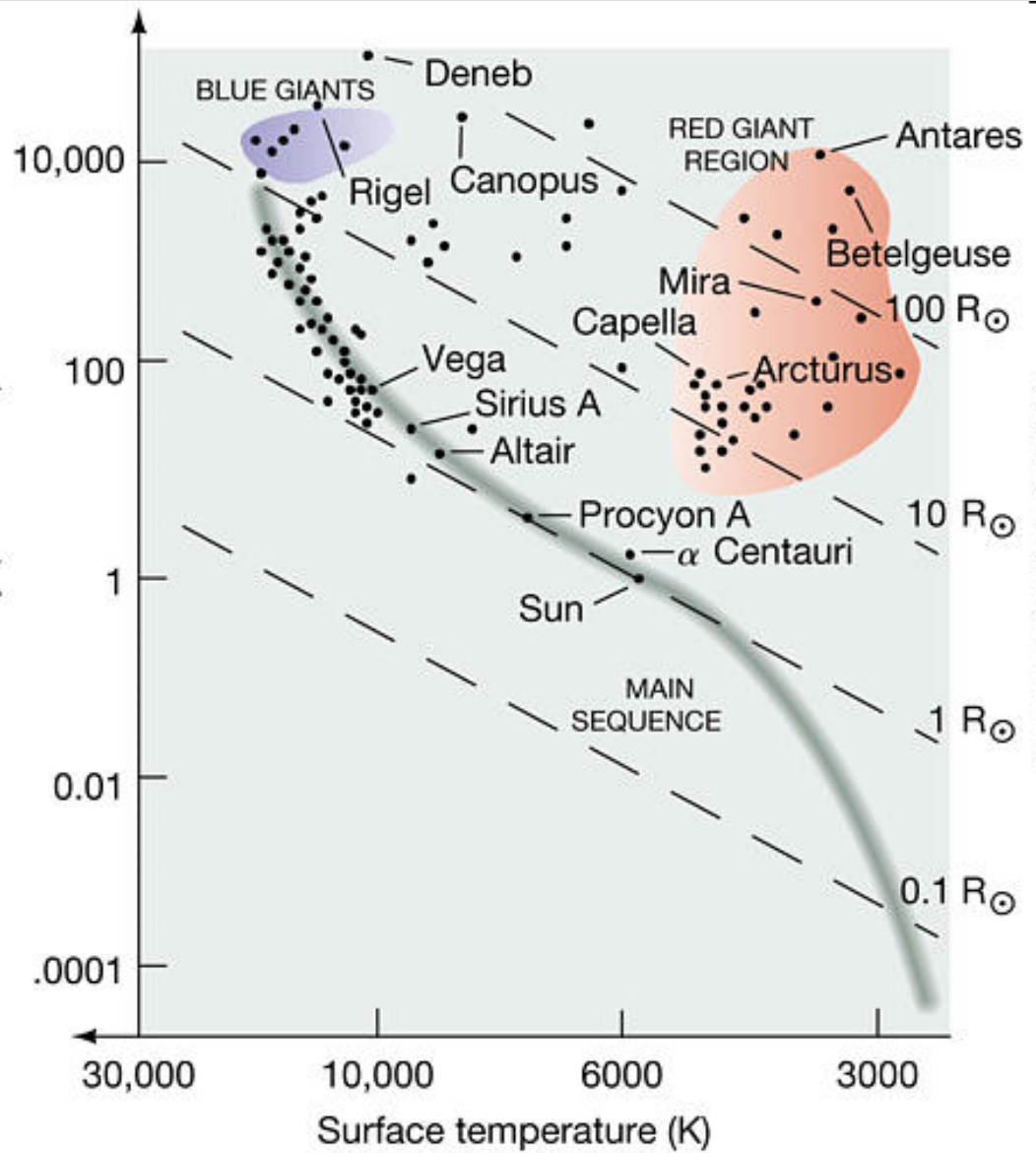
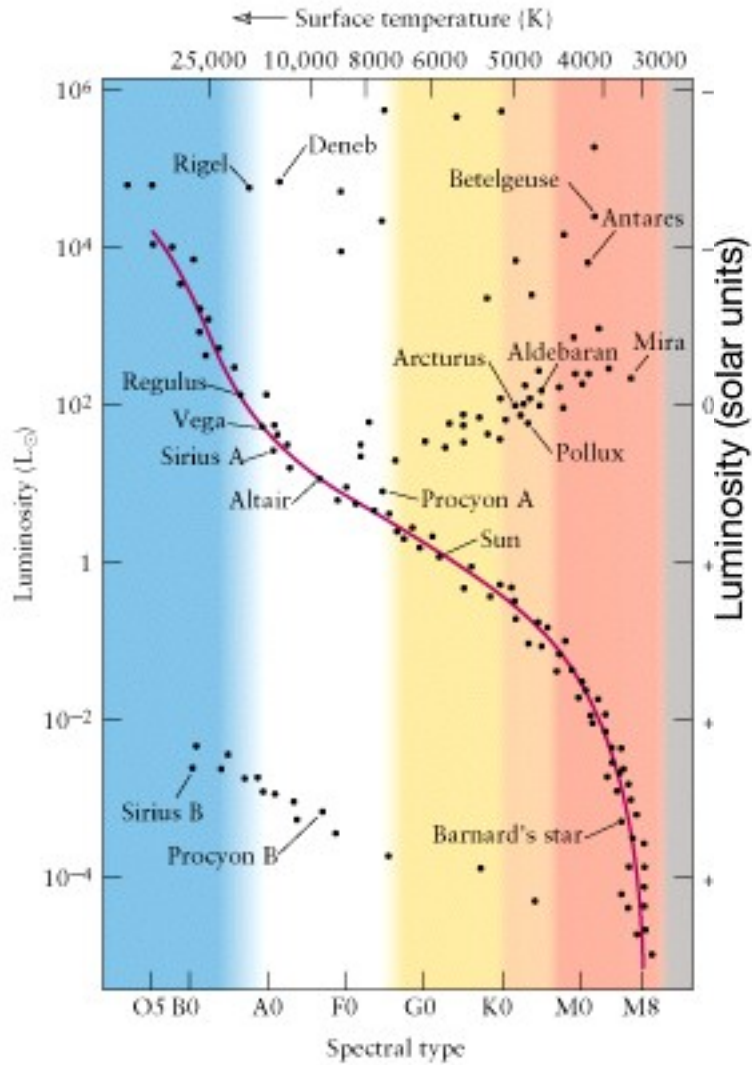




# HR



# HR

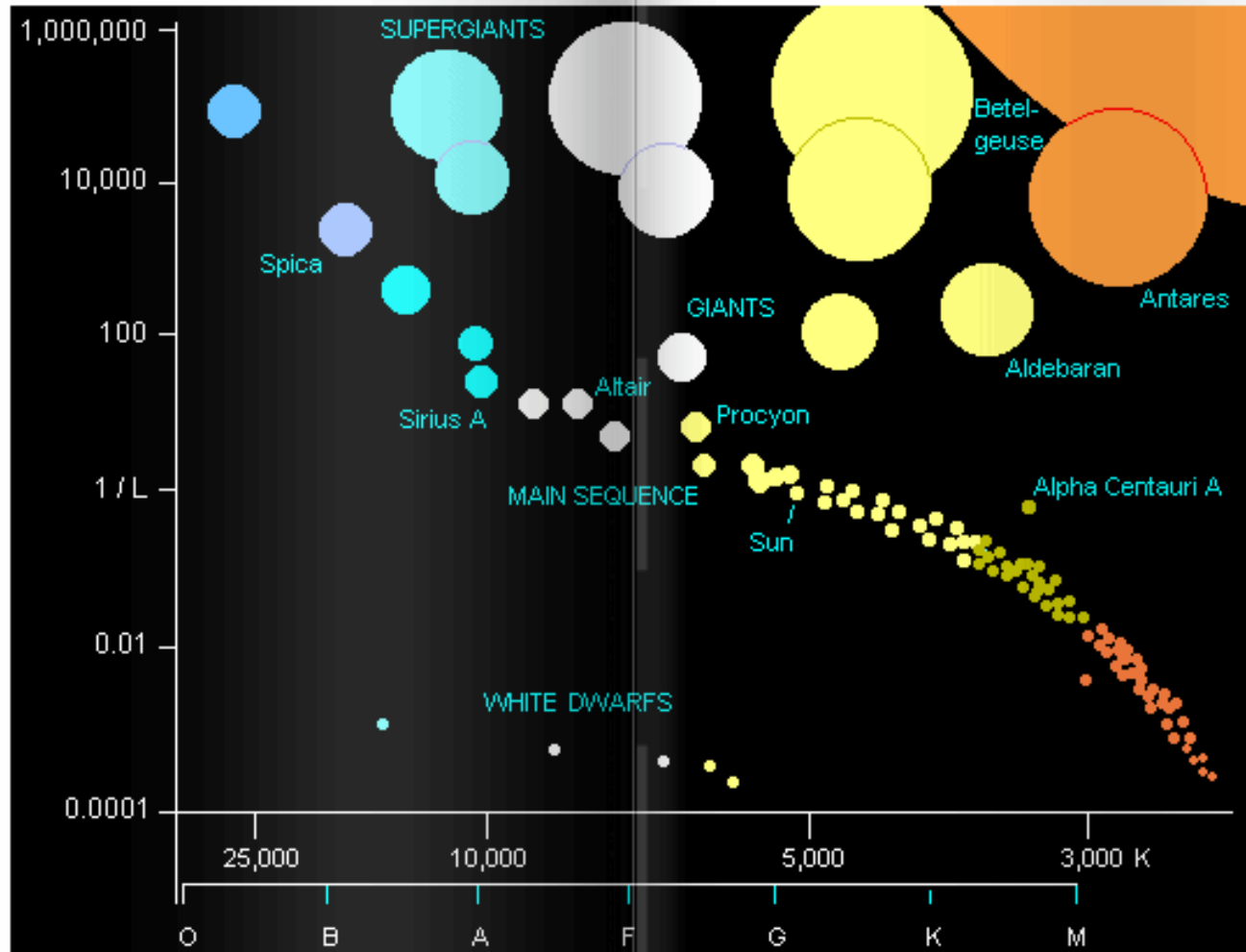


Spectral classification

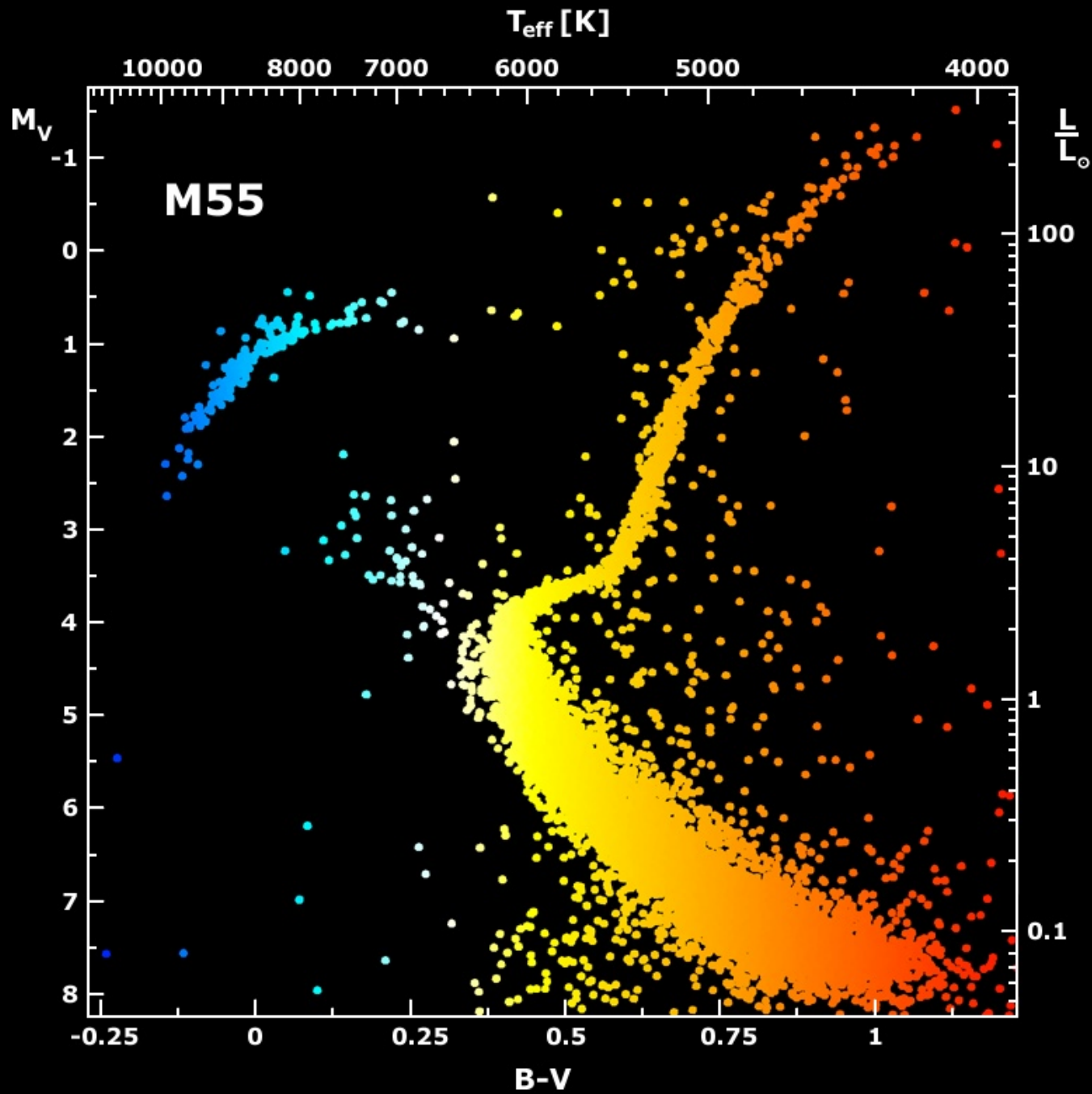
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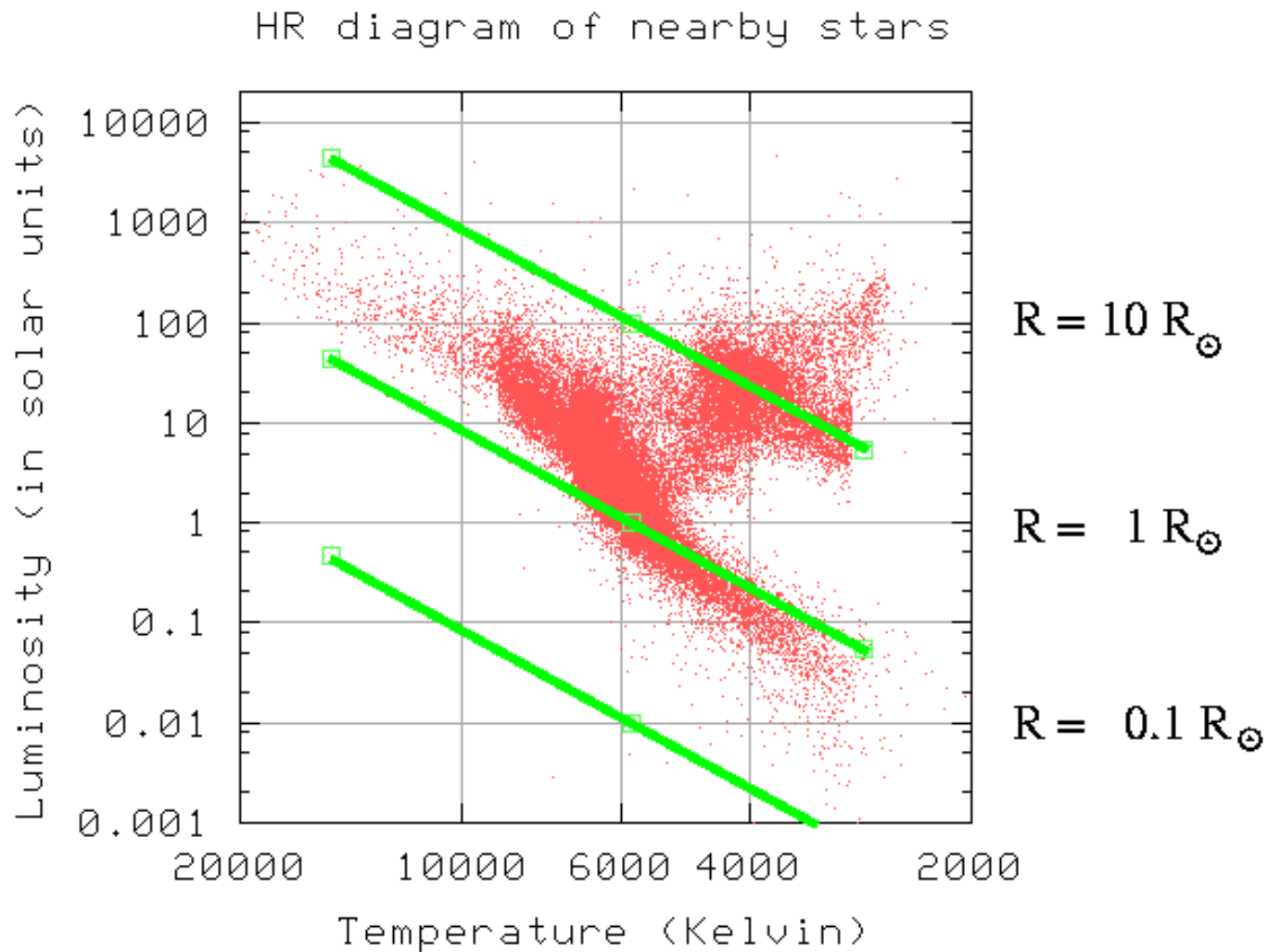
# HR Diyagramı



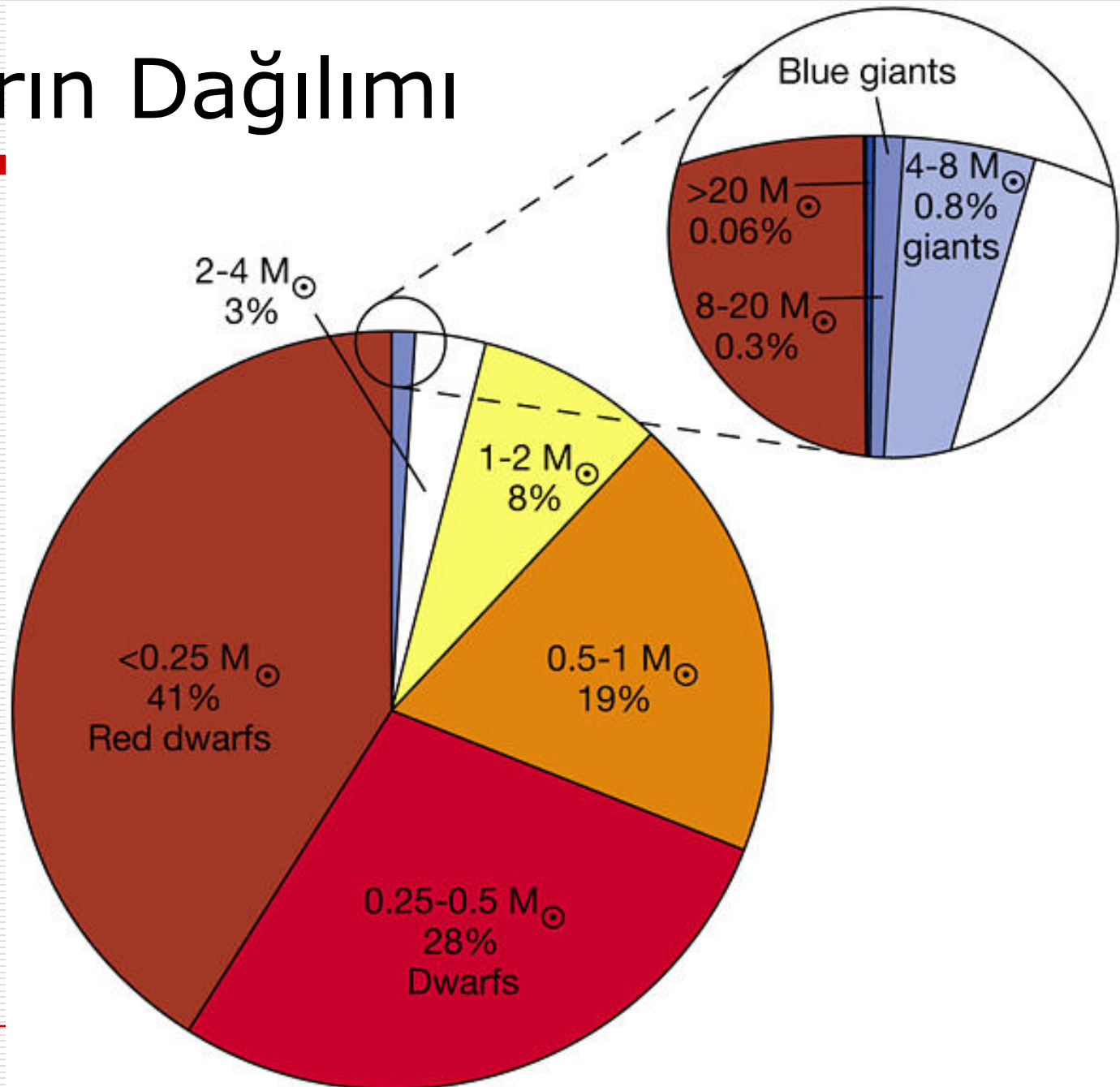
M55  
HR



# Hipparcos, Dikkatinizi Çeken Ne?

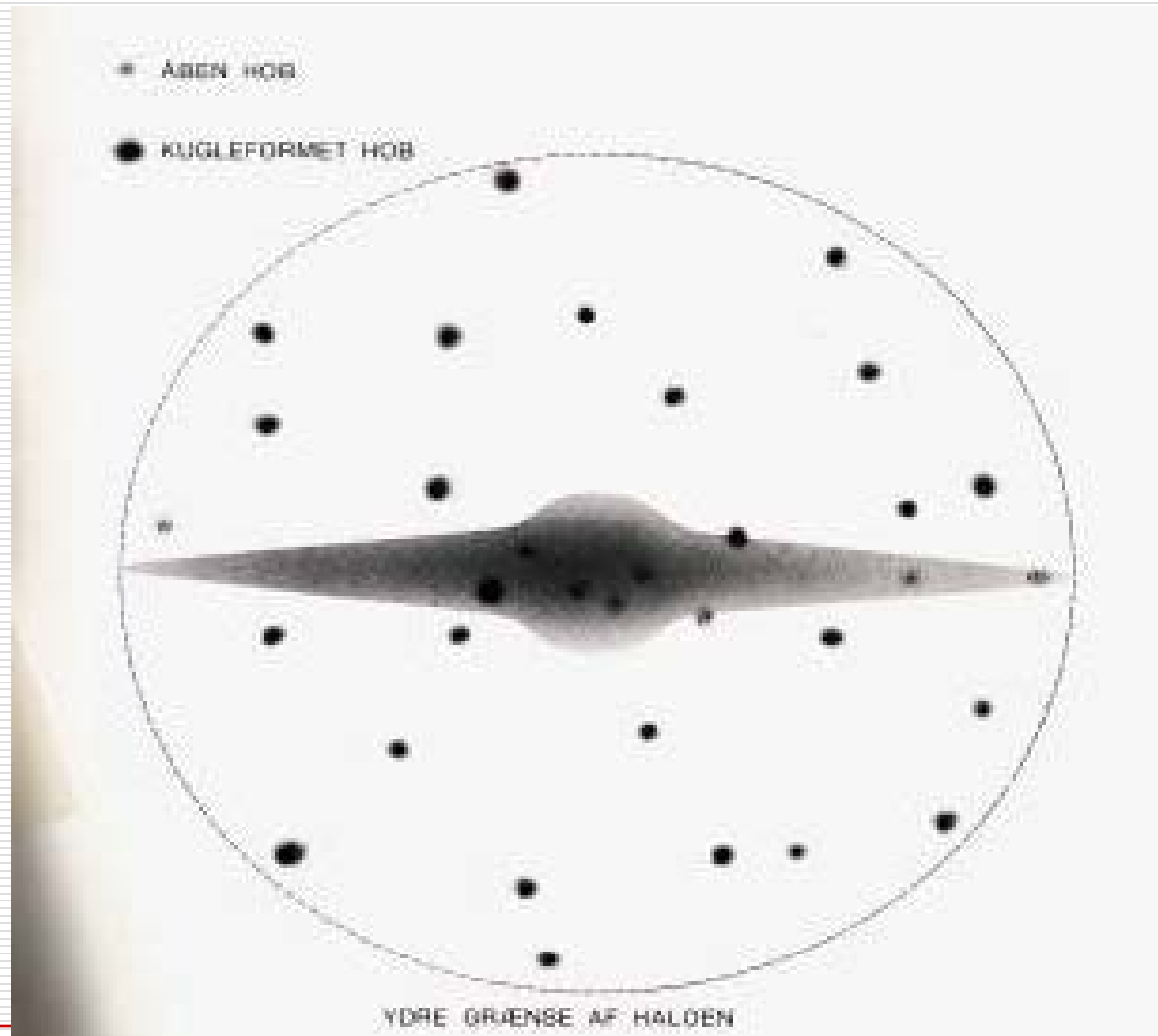


# Yıldızların Dağılımı



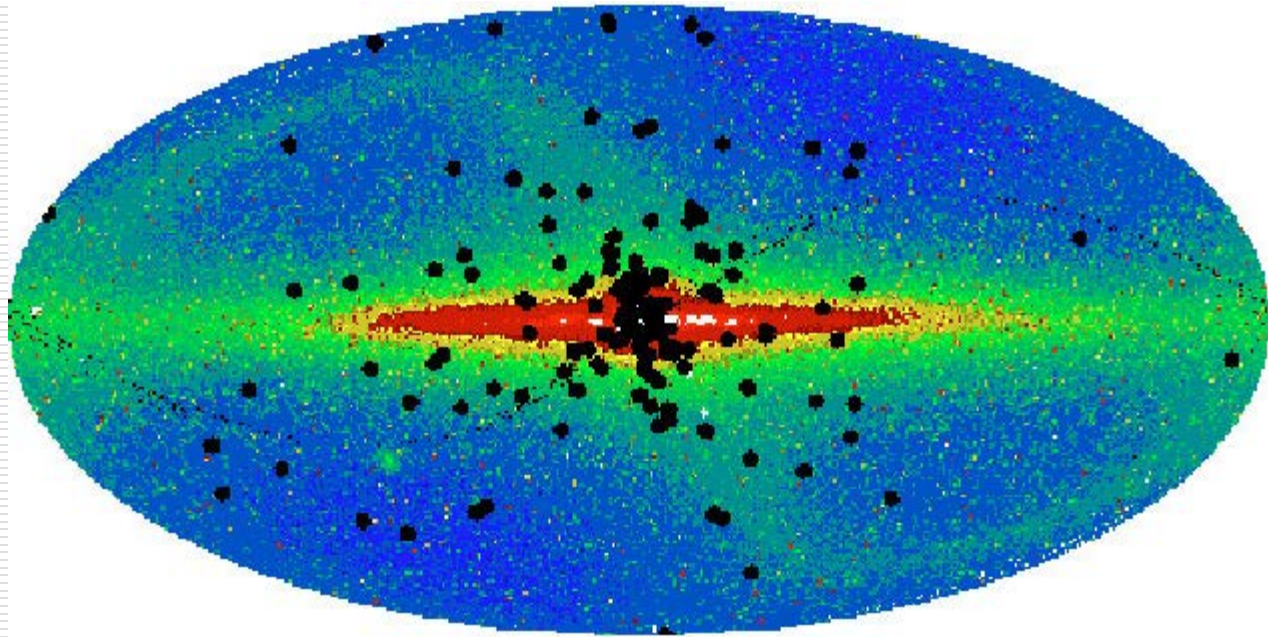
# Kümeler

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# Kümeler

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# Açık (Galaktik) Kümeler

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Pleidas  
açık yıldız  
kümesi.

Genç ve  
yakın bir  
küme



# Açık (Galaktik) Kümeler

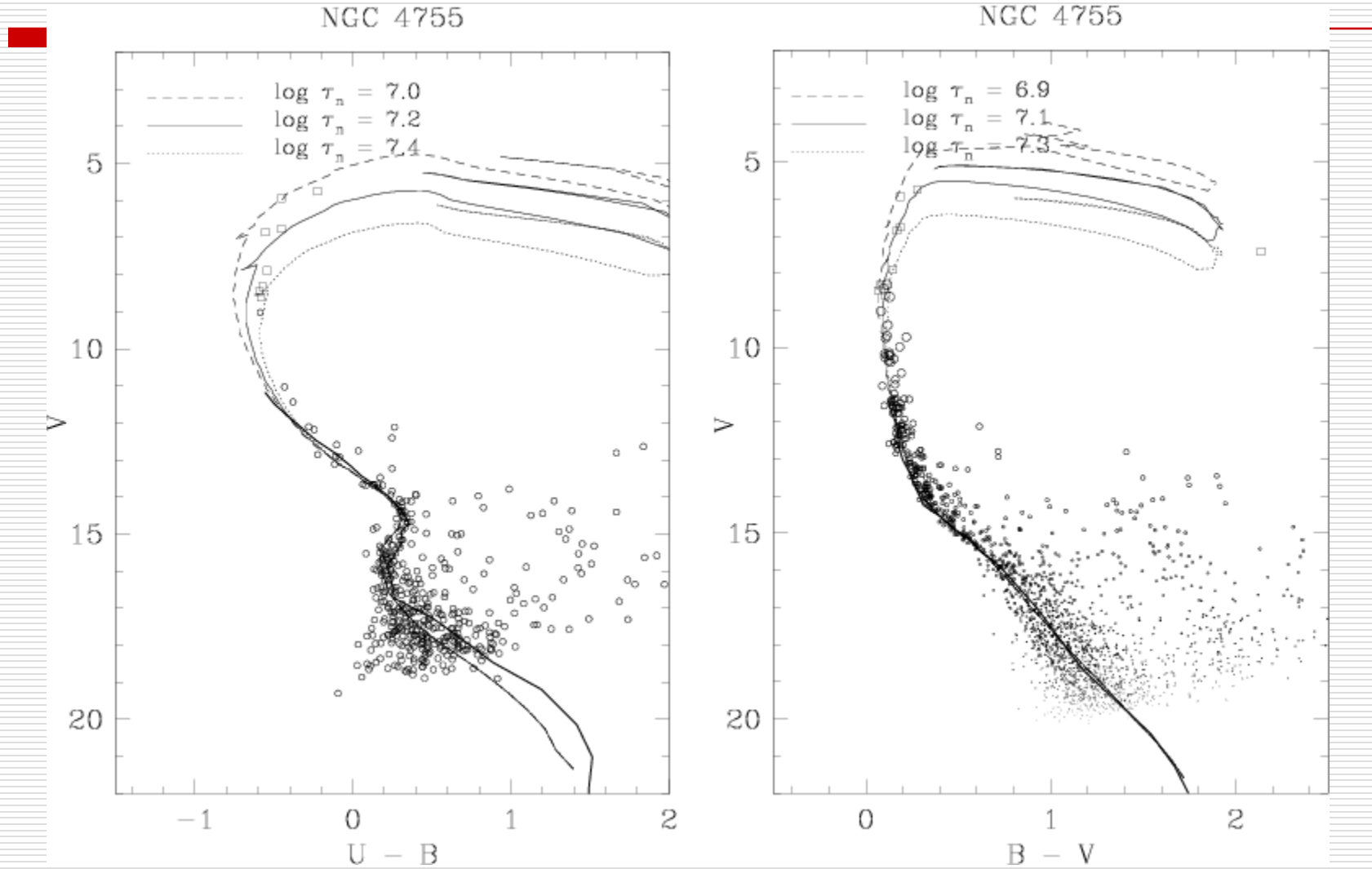
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NGC 4755  
Açık Yıldız  
kümesi,  
GüneyYK.  
Mücevher  
Kutusu  
8150 LY.





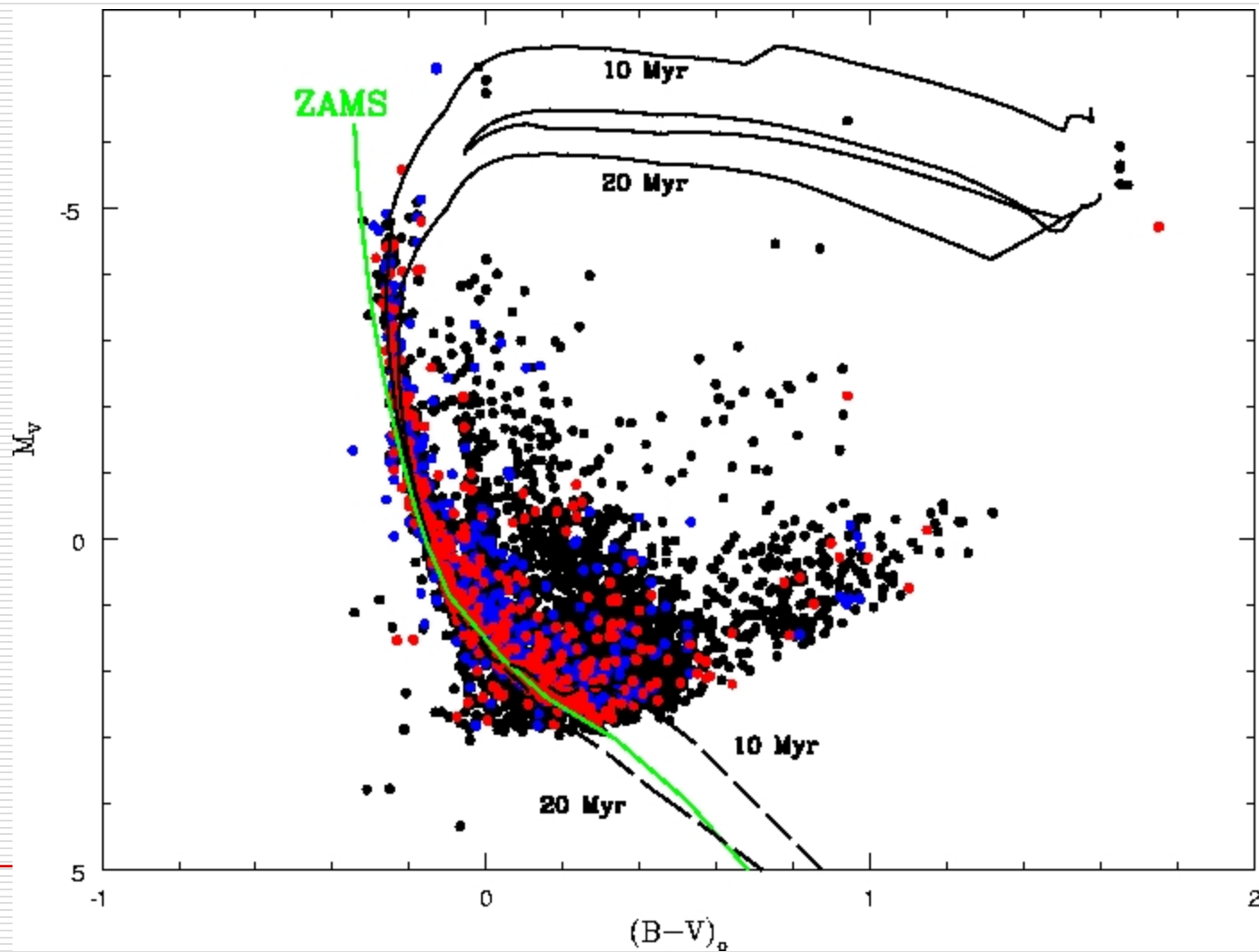
# NGC 4755 CMD



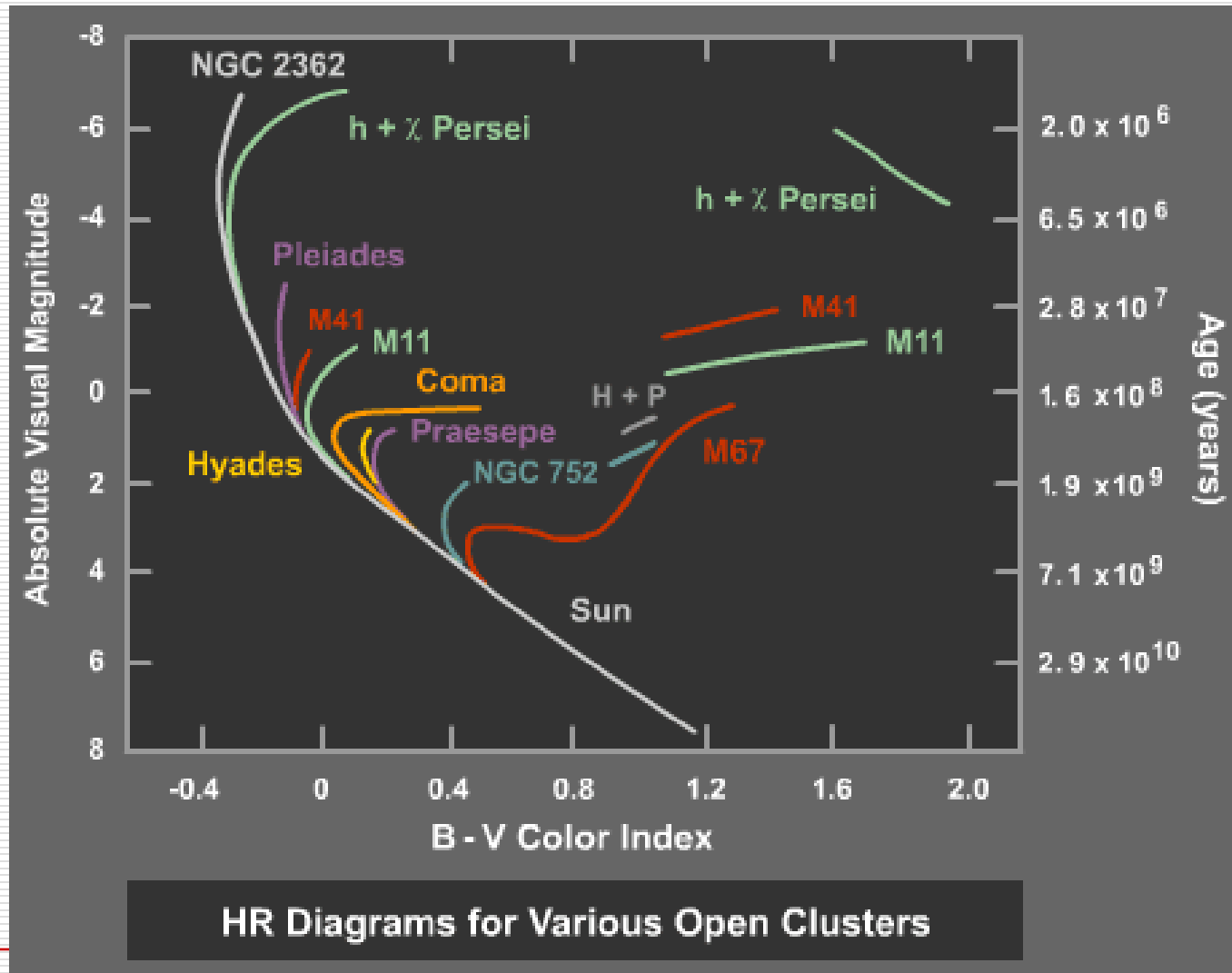
# M869 Açık Küme



# M869 CMD



# Açık Kümelerin HR Diyagramları



# Küresel Kümeler

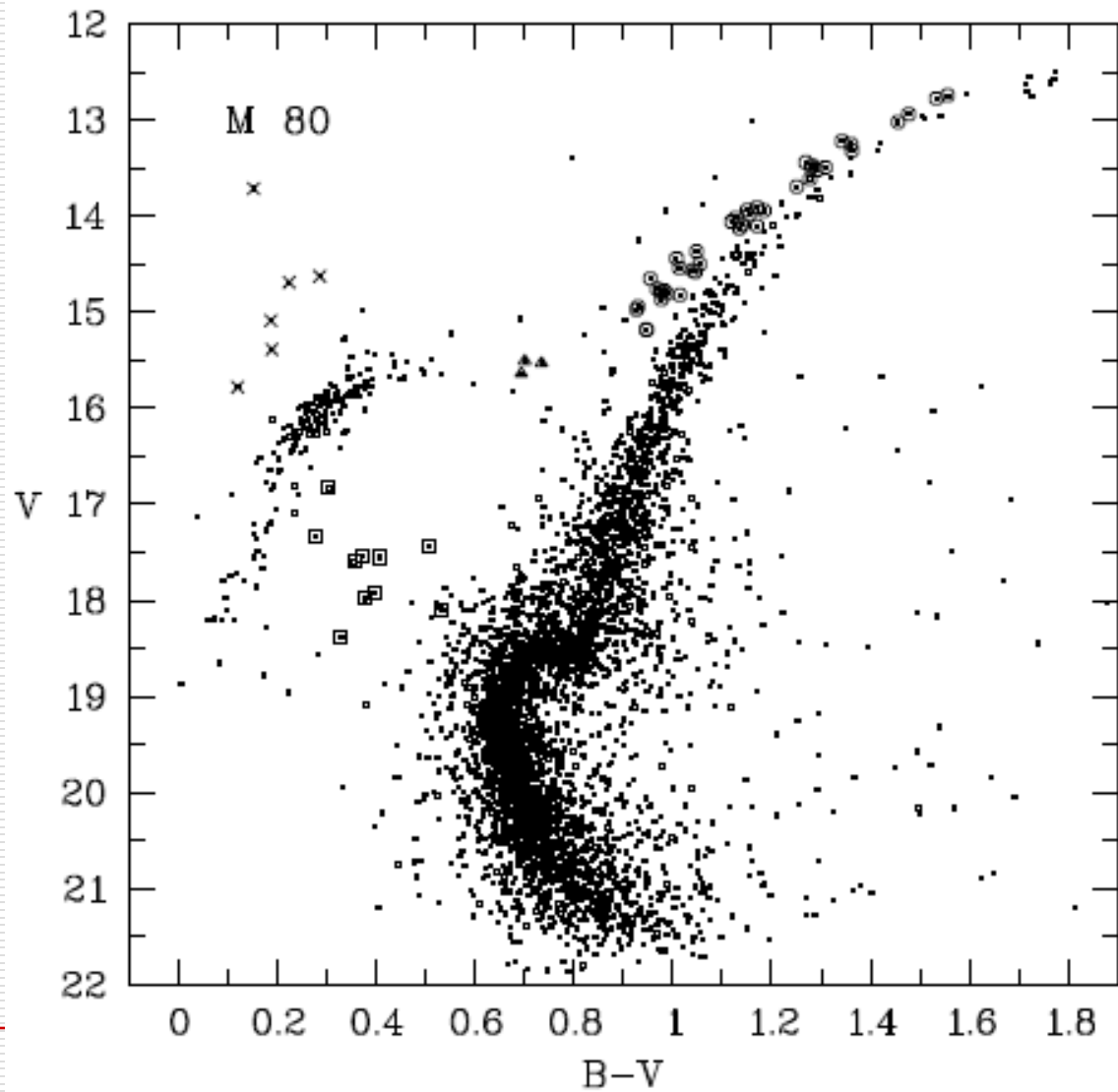
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28000 IY uzaklıktak Akrep  
takımyıldızında bulunan  
**M80** Küresel kümesi.

100 binlerce yıldız içerir.



# M80 CMD



# M3 Küresel Küme

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# M3 CMD

