
Light Pollution Filters

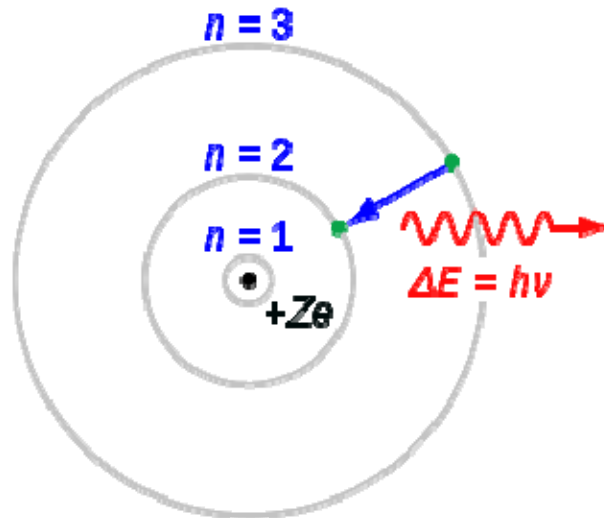


S.D. Sudhoff

December 1, 2018

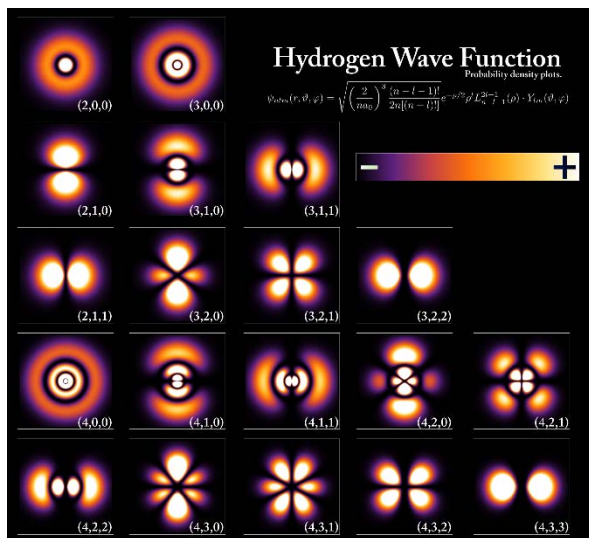
Spectrum of Rarified Gases

- Bohr model



Spectrum of Rarified Gases

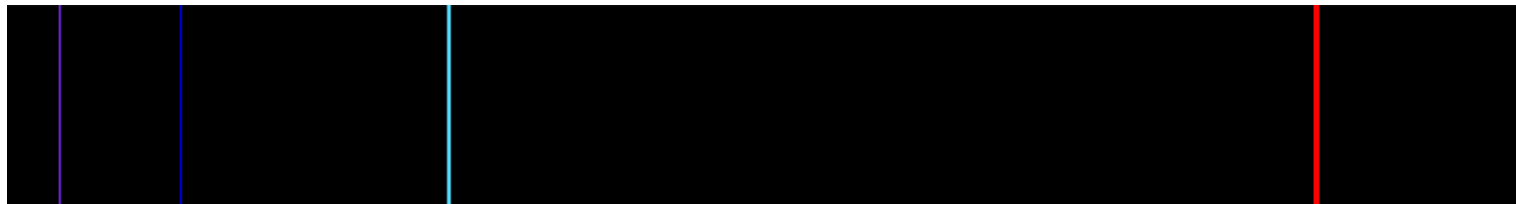
Subshell label	ℓ	Max electrons	Shells containing it	Historical name
s	0	2	Every shell	sharp
p	1	6	2nd shell and higher	principal
d	2	10	3rd shell and higher	diffuse
f	3	14	4th shell and higher	fundamental
g	4	18	5th shell and higher (theoretically)	<i>(next in alphabet after f, excluding j)</i> ^[5]



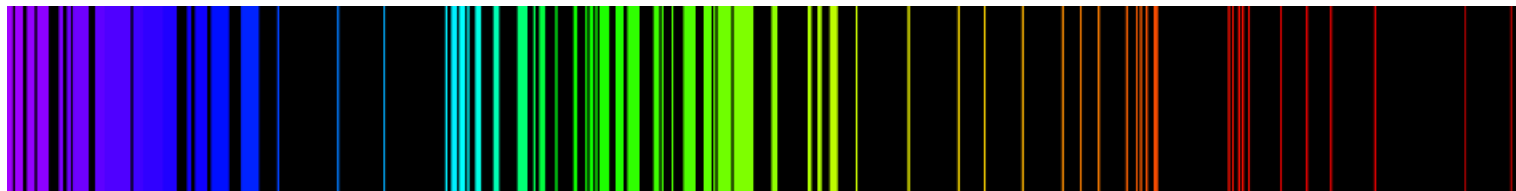
(energy,
angular momentum,
angular momentum vector component)

https://en.wikipedia.org/wiki/Electron_shell
https://en.wikipedia.org/wiki/Atomic_orbital

Emission Spectrum



Hydrogen

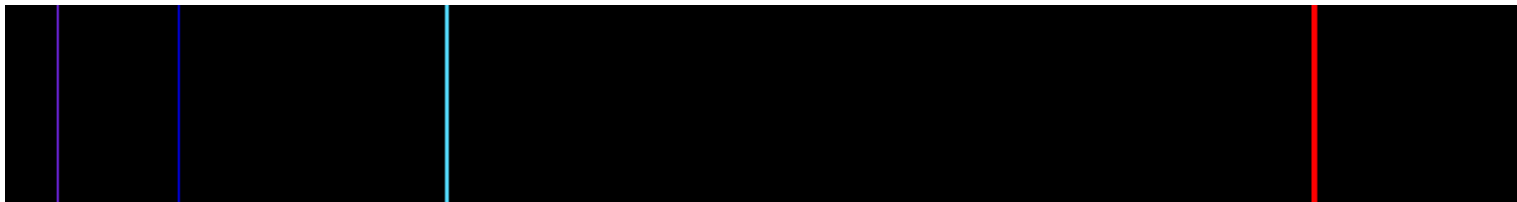


Iron

Hydrogen

- Hydrogen Lines

Transition of n	3→2	4→2	5→2	6→2	7→2	8→2	9→2	∞ →2
Name	H- α / Ba- α	H- β / Ba- β	H- γ / Ba- γ	H- δ / Ba- δ	H- ϵ / Ba- ϵ	H- ζ / Ba- ζ	H- η / Ba- η	Balmer break
Wavelength (nm)	656.45377 ^[2]	486.13615 ^[3]	434.0462 ^[3]	410.174 ^[4]	397.0072 ^[4]	388.9049 ^[4]	383.5384 ^[4]	364.6
Energy difference (eV)	1.89	2.55	2.86	3.03	3.13	3.19	3.23	3.40
Color	Red	Aqua	Blue	Violet	(Ultraviolet)	(Ultraviolet)	(Ultraviolet)	(Ultraviolet)



Doubly Ionized Oxygen

- O^{2+} (O III)
 - Wavelengths of 500.7 nm and 496 nm

Mercury Vapor Lamps

Wavelength (nm)	Name (see photoresist)	Color
184.45		ultraviolet (UVC)
253.7		ultraviolet (UVC)
365.4	I-line	ultraviolet (UVA)
404.7	H-line	violet
435.8	G-line	blue
546.1		green
578.2		yellow-orange



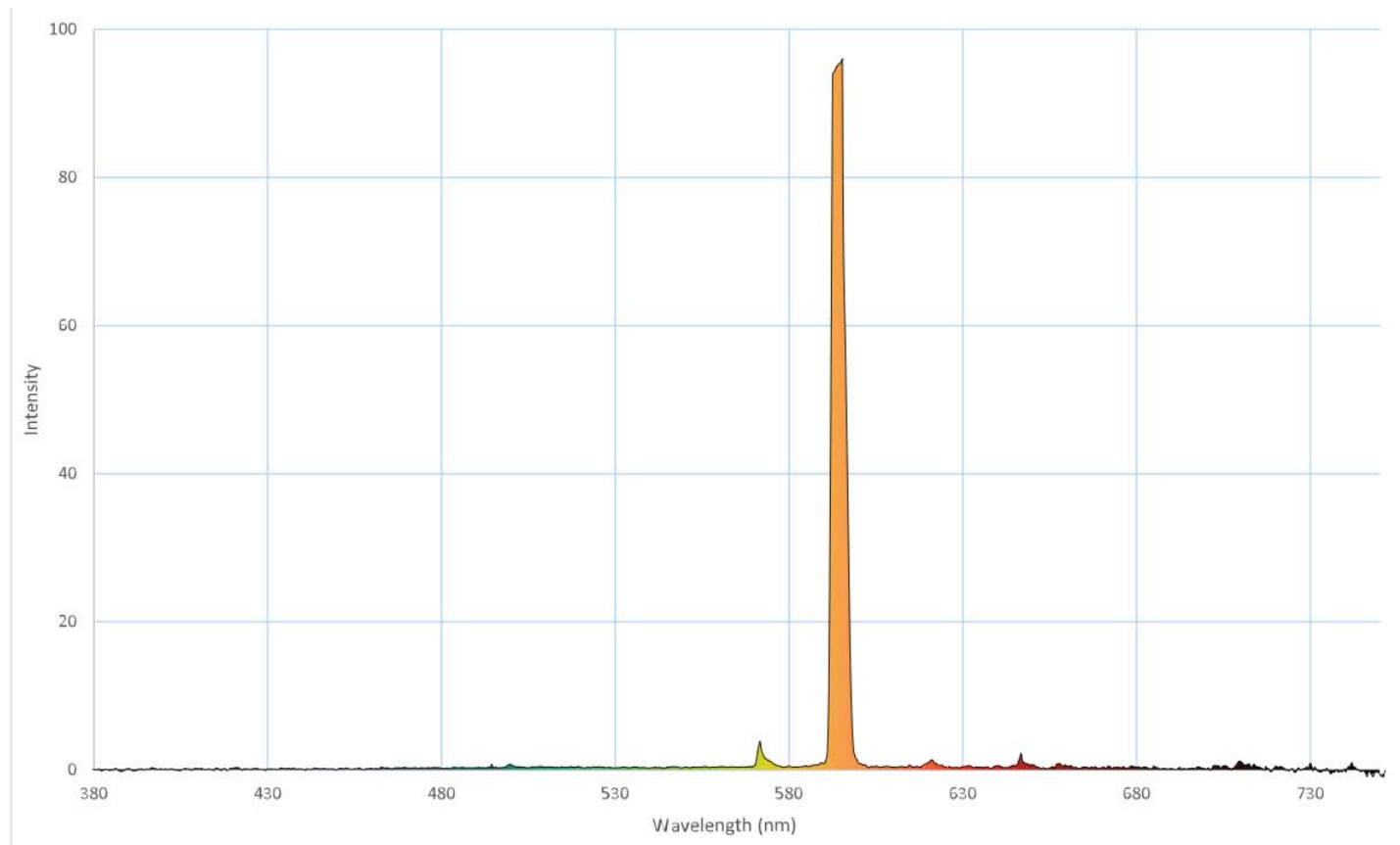
Low pressure lamps: 184 nm and 253 nm

Medium pressure lamps: 200-600 nm features are present

High pressure lamps: Primarily blue 435.8 nm and green 546.1 nm

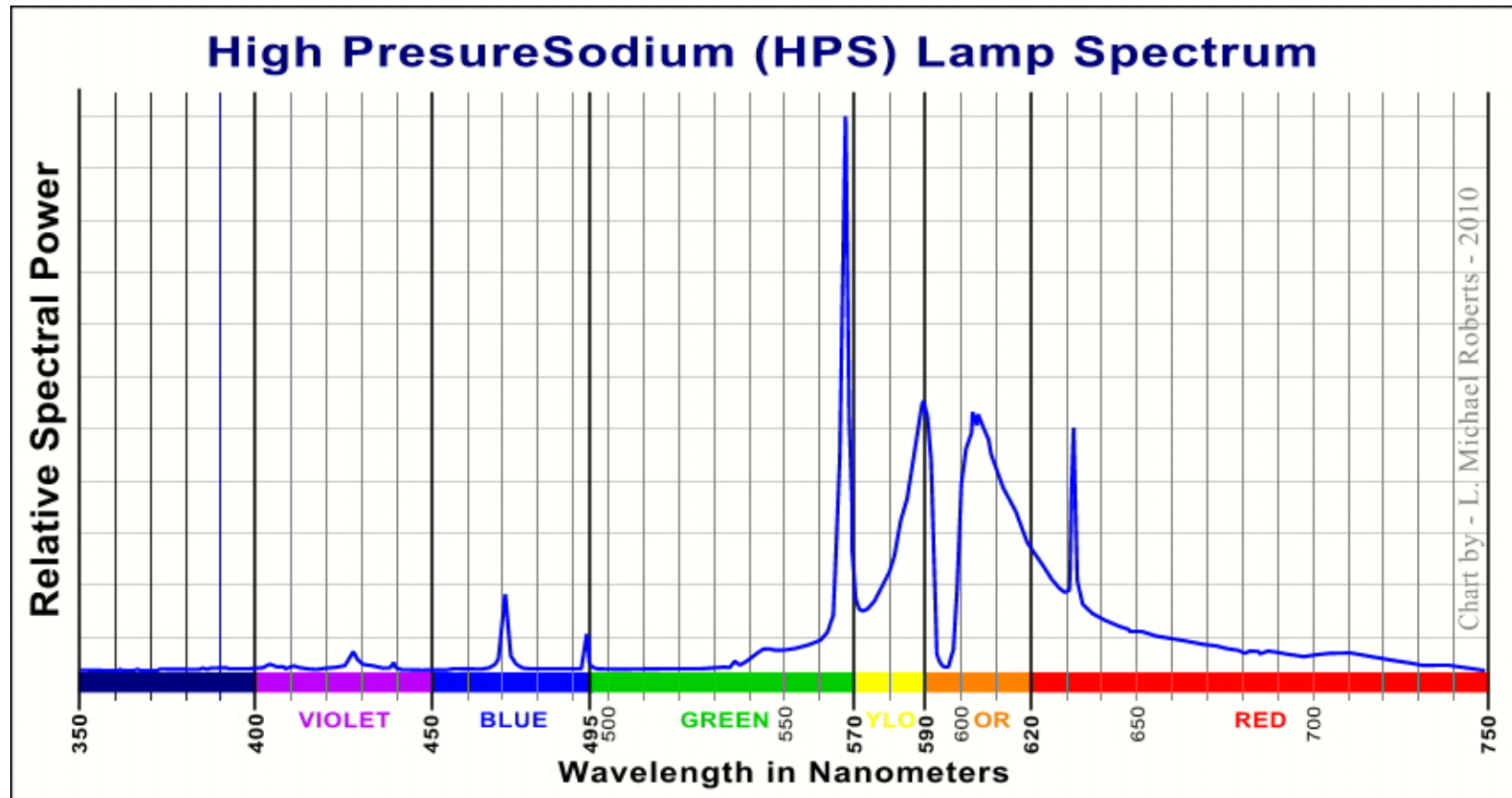
https://en.wikipedia.org/wiki/Mercury-vapor_lamp

Low Pressure Sodium Lamps



https://en.wikipedia.org/wiki/Sodium-vapor_lamp

High Pressure Sodium Lamps



https://en.wikipedia.org/wiki/Sodium-vapor_lamp

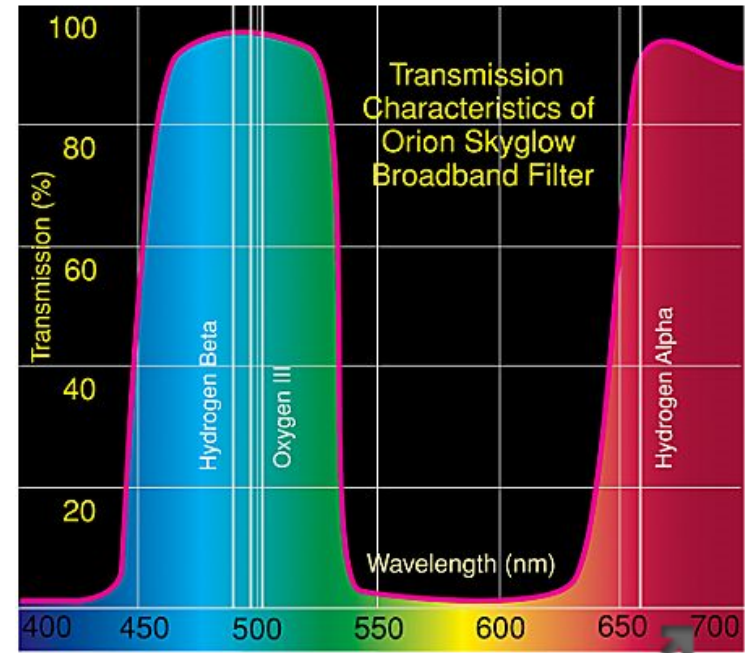
Summary

- The Good List:
 - 656 nm (H-alpha)
 - 501 nm (Oxygen III)
 - 496 nm (Oxygen III)
 - 486 nm (H-beta)
- The Bad List
 - 536 nm (High-pressure Mercury)
 - 546 nm (High-pressure Mercury)
 - 589 nm (Low-pressure Sodium)
 - 550-650 nm (High-pressure Sodium)

An Aside

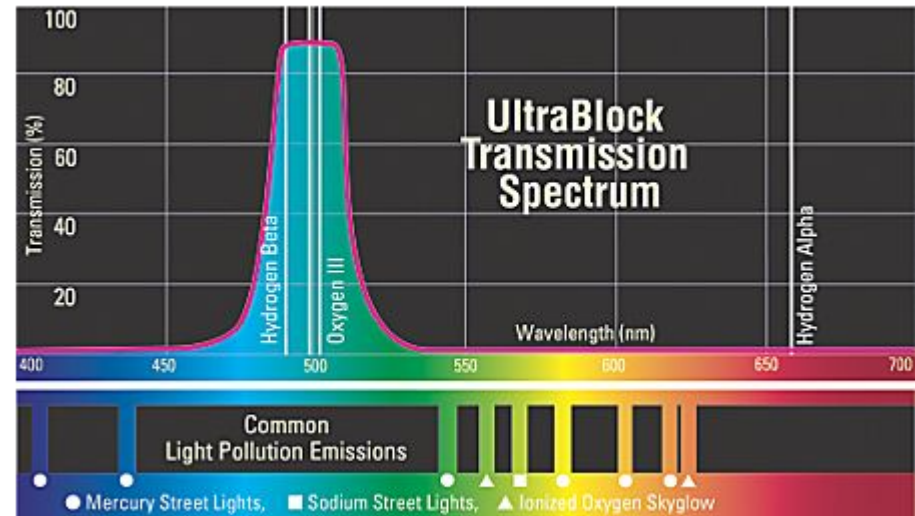
- IR Block
 - Help with small star size, particularly on refractors
 - Hurts with galaxies
- UV Block
 - Again, helps with small star size and sharpness, particularly on refractors

2" Orion SkyGlow Broadband Filter (\$69.99)



486,496,501,536,546,589,550-650,656

2" Orion UltraBlock Narrowband Eyepiece Filter \$99.99



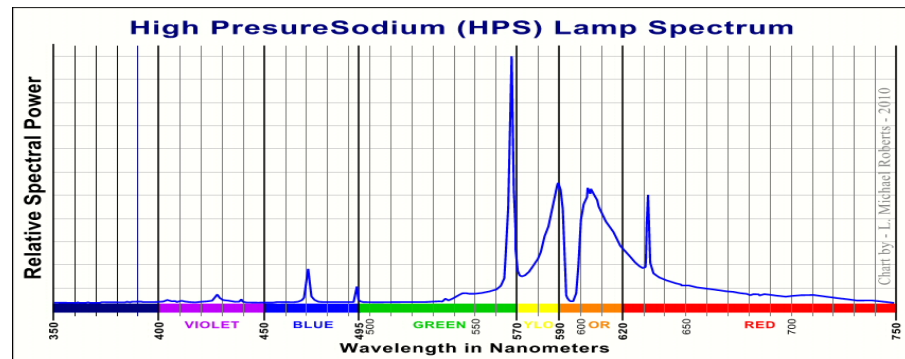
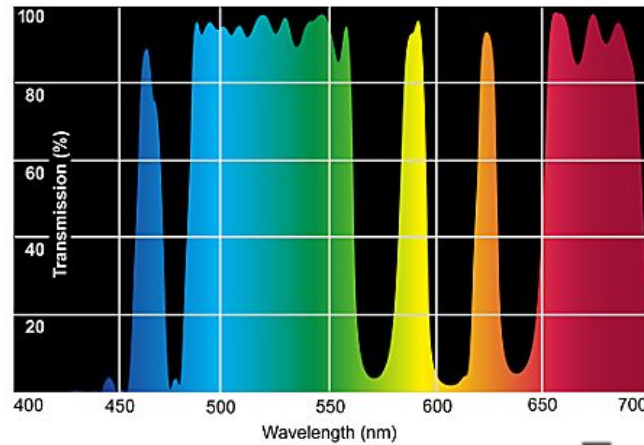
486,496,501,536,546,589,550-650,656

2" Orion SkyGlow Imaging Filter

\$159.99

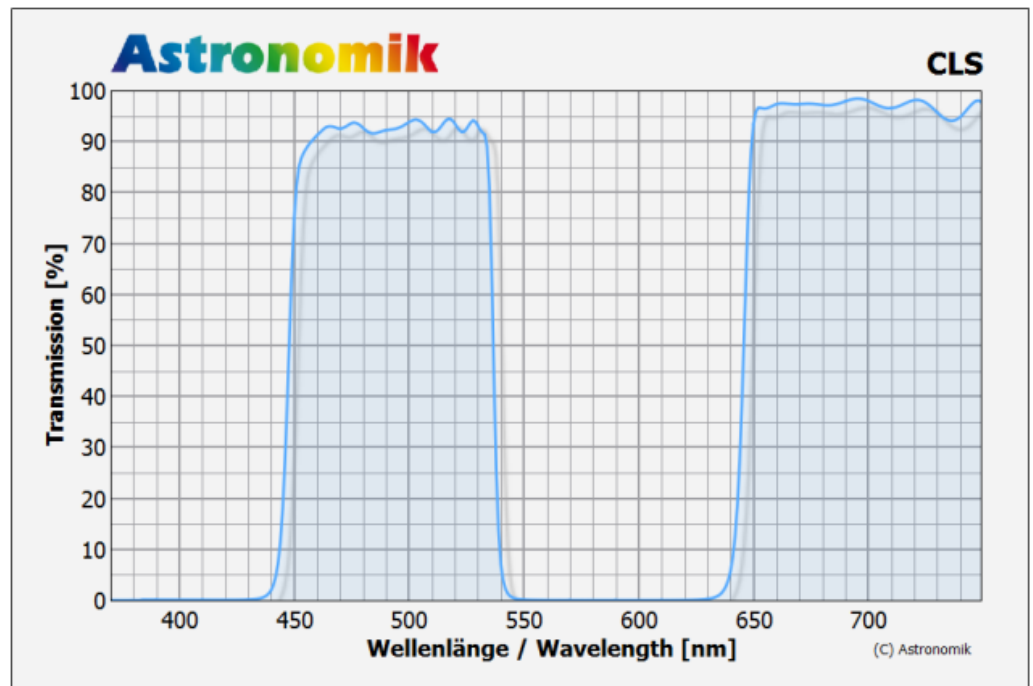


Transmission Characteristics of Orion SkyGlow Imaging Filter



486,496,501,536,546,589,550-650,656

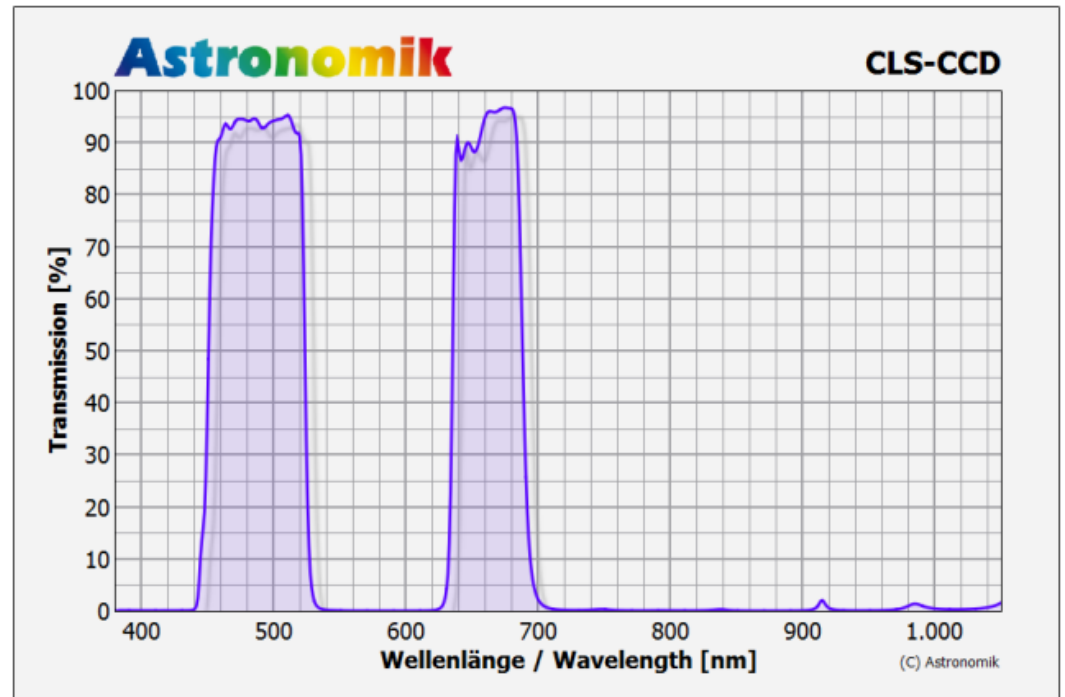
2" Astronomik CLS (\$156)



486,496,501,536,546,589,550-650,656

<https://www.astronomik.com/en/visual-filters/cls-filter.html>

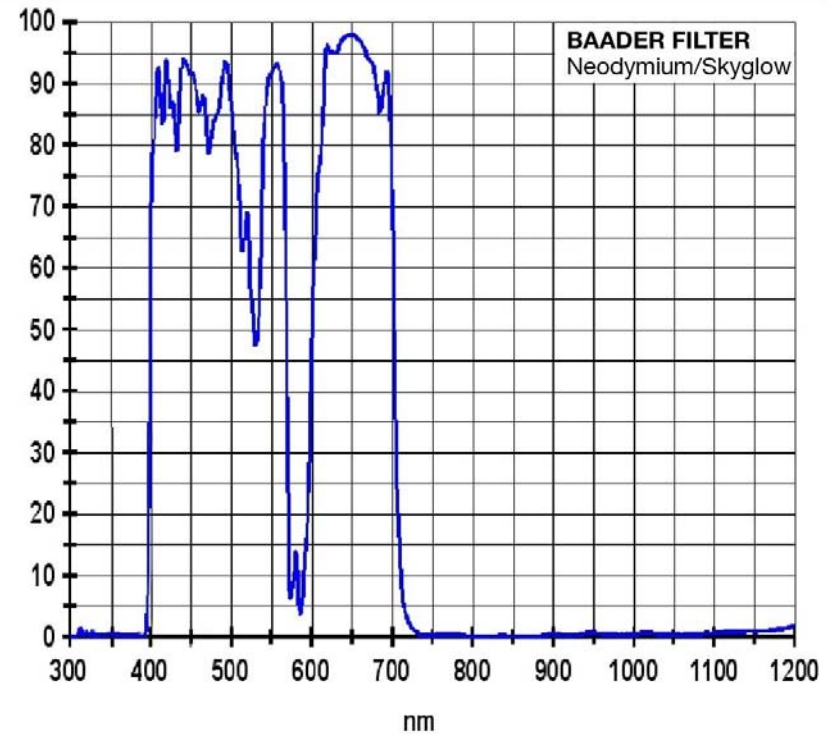
2" Astronomik CLS CCD (\$200)



486,496,501,536,546,589,550-650,656

<https://www.astronomik.com/en/filter-gegen-lichtverschmutzung-filter-against-lightpollution-lpr/cls-ccd-filter.html>

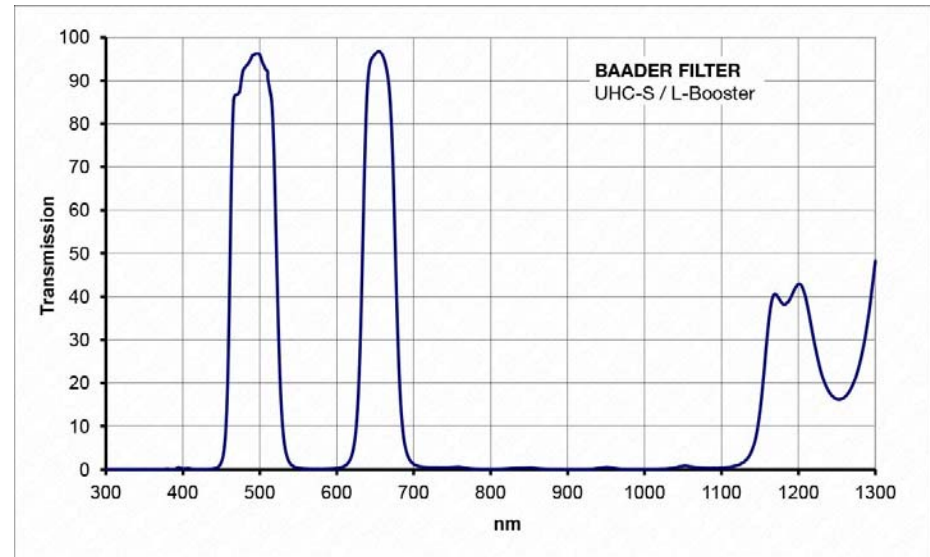
2" Baader Neodymium (Moon & Skyglow)-Filter (\$132)



486,496,501,536,546,589,550-650,656

[https://www.baader-planetarium.com/en/baader-neodymium-\(moon-and-skyglow\)-filter.html](https://www.baader-planetarium.com/en/baader-neodymium-(moon-and-skyglow)-filter.html)

Baader UHC-S Nebula-Filter (\$147)



486,496,501,536,546,589,550-650,656

<https://www.baader-planetarium.com/en/filters/deep-sky/baader-uhc-s--l-booster-filter.html>