

# Xenon Calibration Unit for the Dados Spectrograph

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The xenon calibration unit is an easy and cheap way how to calibrate the blue-green region of spectrum with a grating which provides a higher resolution.

My solution is complex, so that I can use two same brackets for neon and xenon lamp. This solution allows accurate calibration without having to take the spectrograph down from the telescope.

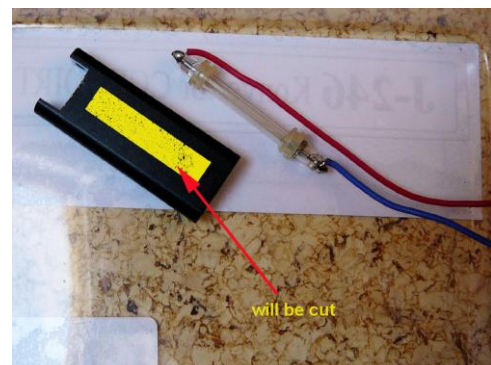
The easiest for me was to use the slim off-axis-guider offered by Teleskop Service equipped with the T-adapters on both sides. The ring part of the OAG is attached to the Dados and the sliding part of the OAG with the prism which is hollow is used as a xenon tube bracket. I needed two these sliding parts, because I used the second one for the neon glow lamp. The prism must be removed which is likely to cause its destruction because at the new versions of the OAG it is glued to its holder.



The OAG body attached to the Dados with the sleeve holding the neon glow lamp.

The next step is to cut a window for the tube into the original prism holder. This is necessary so that the tube illuminates the slit of the spectrograph. The sleeve with the window and the tube inside is shown on the image below.

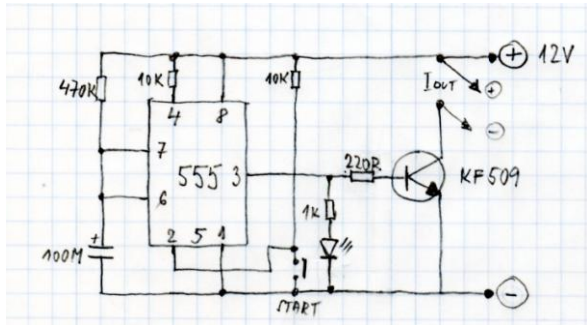
A good source of calibration lines is small xenon flash tube which is commonly used in photographic flash units. It can be purchased separately at many vendors of electronic components. This tube requires relatively high voltage to ignite the discharge, so be careful when you mount the unit and make sure that the terminals do not touch metal housing nowhere. It is best to insulate them by suitable tubing. The protruding end of the tube can be additionally sealed by silicone or resin. The wires from the terminals are kept on the left where originally the prism was attached. This end of the sleeve is sealed by resin. It is important that the lamp holder has a stopper to prevent the entire sleeve sinks down into the OAG ring.



The power supply for the xenon tube must provide sufficient voltage. I used the power source for CCF lamps which is cheap and small. It requires input of 12V DC. The xenon tube is warming up. Although some of

the heat effectively removes material of the telescope and the Dados I equipped the power source with a timer which switches it off after 60 seconds. Just for safety reasons. It is enough time to get the calibration lines even in the blue region of the spectrum. The timer can be easily converted to another switching time by replacing the capacitor  $C=100\text{M}$  and the resistor  $R=470\text{k}$ . The operating time of the timer with the IC555 can be calculated by using the equation below.

$$T_{(s)} = 1,1 * R_{(\Omega)} * C_{(F)}$$



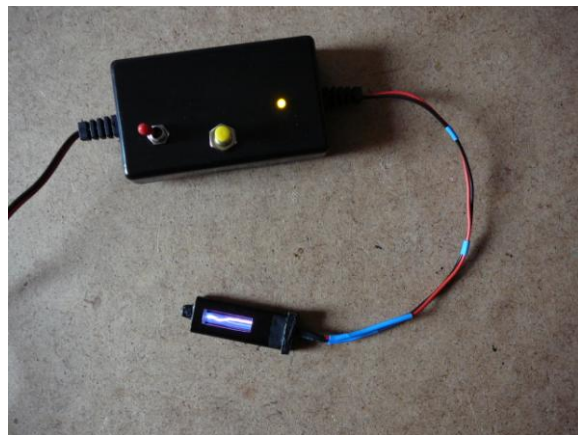
The output from the timer (at left) is connected to the input of the inverter. The timer with the inverter in the operating box is shown below. The main switch is on the wires from the 12V DC power supply.



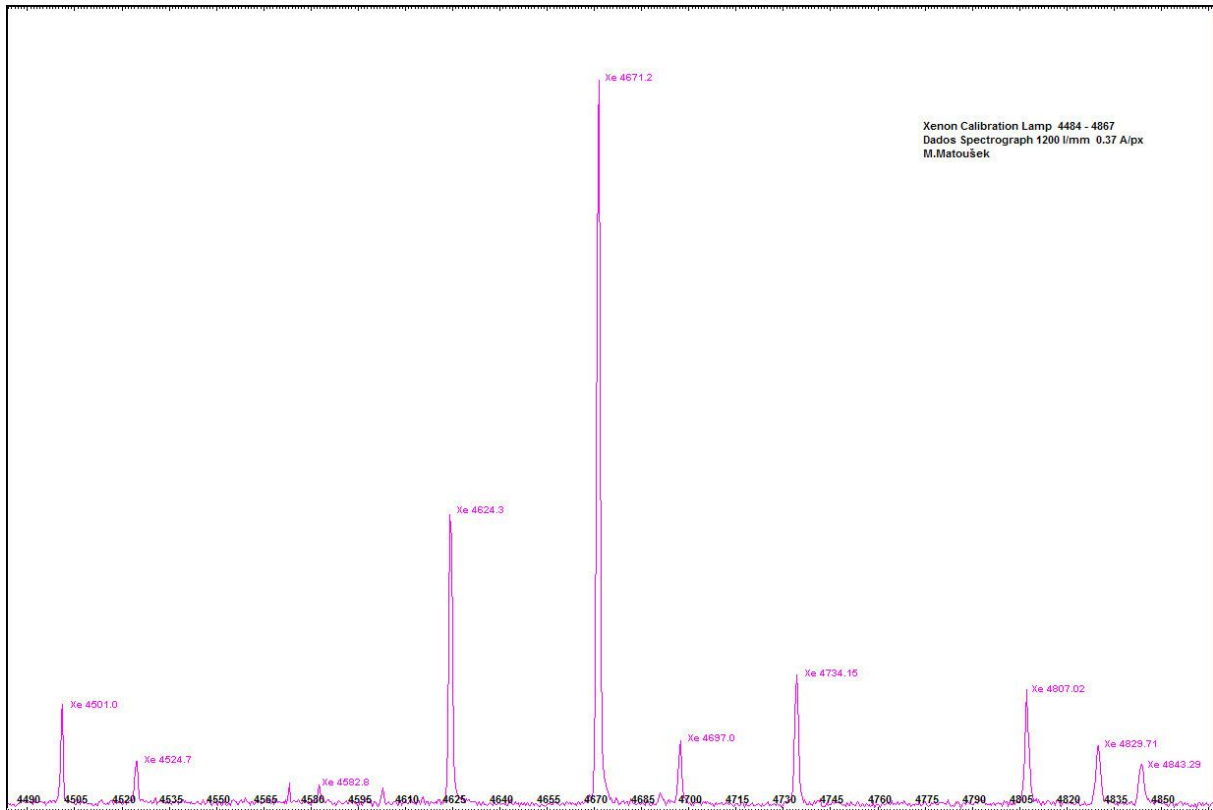
Once the tube is connected to the power a discharge appears between the electrodes in the tube with glowing xenon around.

There are plenty of suitable calibration lines in the xenon spectrum. Below is a list of lines which I tested and found them stable. In the Richard Walker's Spectroscopic Atlas for Amateur Astronomers can be found more lines provided by this xenon tube.

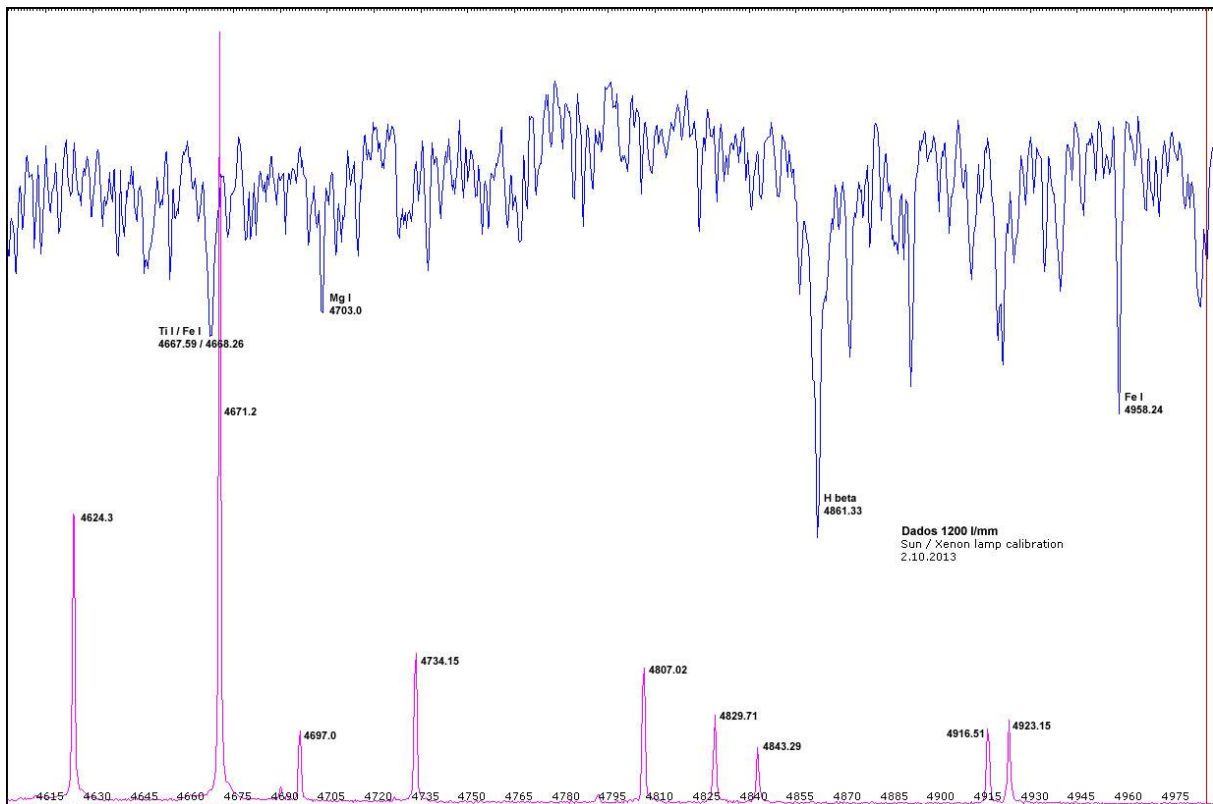
- $\lambda \text{ \AA}$
- 4501.0
- 4524.7
- 4624.3
- 4671.2
- 4697.0
- 4734.15
- 4807.02
- 4829.71
- 4843.29
- 4916.51
- 4923.15
- 5028.28



Below is a graph showing the most of the xenon lines and a spectrogram of the Sun calibrated using the xenon calibration system described here. The calibration unit was used with the Dados spectrograph with the 1200l/mm grating.



Spectrum of the Xenon calibration system



Calibrated spectrum of the Sun