Precautions:

Duty of supervision!!
The device must only be operated by qualified persons or persons who have been instructed in its use.

Handle the glass tube with care to ensure that it remains sealed. The tube is evacuated and sealed. However, the residual gas inside has sufficient pressure to generate a cathode ray during operation.

Carefully clamp the connecting wires to the metal caps, take care to not apply too much force.
Although the metal caps are securely and compactly connected to the glass bulb, they can be damaged by strong mechanical impact.

Before starting the experiment, make sure that the cable connections and voltages are correct.

Do not apply more voltage than necessary to observe this phenomenon, and do not operate the tube for extended periods of time.

Attention!

X-rays can be generated at supply voltages above 5 kV. If the tube requires more than 5 kV to operate, keep the experiments as short as possible. In this case, you should also keep your body as far away from the tube as possible.

Store the device in a well-ventilated, dry place.
Avoid excessive vibration – during operation and storage

Fruhmann GmbH - 7372 Karl, Austria

DE453-3K
Cathode ray tube with Maltese cross

This tube is used to demonstrate the rectilinear propagation of electron beams and the fluorescence of the beams when they strike glass.
When the tube is supplied with a high electrical voltage, beams are emitted from the cathode to the anode. The metal cross inside the tube shields part of the beams, and the shadow of the cross is visible on the front of the tube.
The beams can be deflected by external magnetic fields.

Partially evacuated glass tube with electrodes and external metal caps, metal cross and plastic base.

Glas tube: L=approx. 230 mm, D=approx. 80 mm

① Cathode

② Anode

③ Metal cross

How to use:

A high-voltage device with at least 10 kV DC voltage is required to operate the tube (e.g. P3171-1A High-voltage power supply 10 kV). The high voltage must be applied to the tube in such a way that the negative pole is connected to the cathode and the positive pole to the anode. Since we are working with several kV, connecting cables with sufficiently thick insulation are required. The two cables should not be crossed.
The room must be slightly darkened.

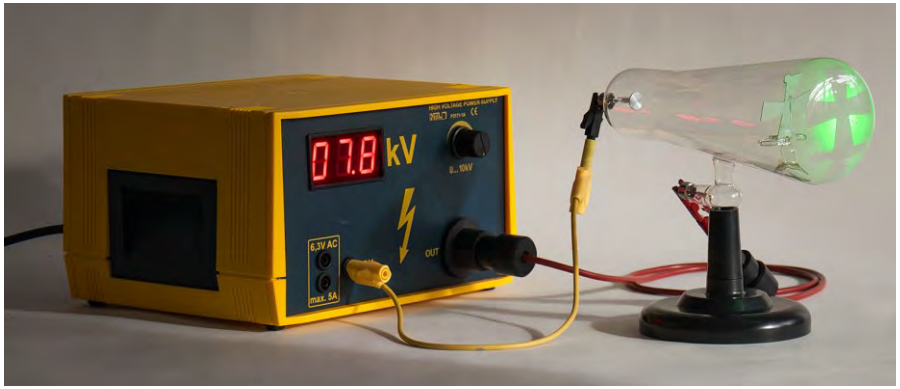
When the voltage is sufficient, a gas discharge occurs between the electrodes, which is visible as green rays. Electrons move at considerable speed from the cathode to the anode.
Some of the rays are shielded by the metal cross. The remaining rays cast the shadow of the metal cross on the front of the tube.
If the room is sufficiently darkened, the contours of the cross should be clearly visible, proving the straight-line propagation.

On a second attempt, the metal cross can be turned over by slowly turning the tube upside down and then turning it again with the cathode side facing downwards.
Before doing so, it is essential to turn off the power supply and disconnect it!
If there is no metal object in between, the screen is completely illuminated.

The front of the glass tube is not coated, but the shape of the cross can still be seen in the first experiment. This proves that glass naturally fluoresces when struck by the cathode ray.

Explanation:

Cathode rays are corpuscular rays and consist of negatively charged electrons that have been accelerated towards the anode in an electric field.
In a field-free space, their path is straight.
Cathode rays can be shielded by metallic objects



Required for operation:

1 Stk.	DE453-3K	Cathode ray tube with Maltese cross
1 Stk.	P3171-1B	High-voltage power supply, 10 kV with digital display, "demo"
2 Stk.	DG509-1A	High-voltage connecting leads
1 Stk.	DG500-3R	Crocodile clip, insulated, red
1 Stk.	DG500-3S	Crocodile clip, insulated, black

Relative humidity:	not higher than 80%
Room temperature:	-10 … +40 °C