Tamed Lightning

More Details

Zap! Bang! Whoosh! – How to shoot lightning without being a superhero

To generate this luminous plasma, all that is needed is a powerful electric field and a thin soup of noble gas (in our case: neon and xenon). Inside the globe, there is an electrode to which a rapidly alternating high voltage is applied. This shimmering electric field acts on the gas and virtually tears it apart. Individual electrons are released and catapulted through the globe by the field. They hit other gas particles and also snatch electrons from them. Now we have – somewhat brutally – produced electrically conductive plasma. The gas particles are split into free electrons and positively charged ions. In most cases, the energy of one electron is not sufficient to ionise the gas particle in the collision. The gas particle is then only excited, i.e. the energy is stored in the particle for a moment and then released again as a flash of light (neon: red, xenon: blue). If a conductor is brought into the field that extends through the glass globe into the room, the flashes attempt to reach it. We are also conductors, that is why your hands attract the flashes.

Plasma wherever you look

On Earth, matter lies around, still and electrically neutral – a special feature of space! Over 99% of visible matter in space is in the plasma state; this is true even for essential layers of the Earth's atmosphere. Above our heads, the sun's radiation, itself a large ball of plasma, causes the ionisation of air particles, which then reflect or swallow

radio waves, or participate in the creation of the polar lights. Plasma can be very useful: in light tubes, for example, ionised mercury stimulates the coating of a glass tube to glow. The ITER fusion reactor in southern France is expected to be really hot in a few years' time. There they are developing and researching a kind of artificial sun by heating hydrogen plasma to millions of degrees Celsius. The hydrogen atoms fuse, releasing even more heat – the energy production of the future?

Nikola Tesla – The prototype of the genius-crazy scientist

In 1894, inventor Nikola Tesla applied for a patent for his "noble gas discharge tube", a precursor of the plasma globe – just one of his many inventions. After studying electrical engineering for a short time in Graz, Prague and Budapest, Tesla moved to the USA in 1884 – with nothing but a letter of recommendation from his former employer. Soon he worked for Thomas Edison's company "General Electric" and developed novel generators and motors. Because he was convinced of the superiority of alternating current, but Edison thought little of his visions, Tesla founded his own company. He also developed the radio, remote controls and the first X-ray tubes. He thereby founded the electric age. Tesla sold himself and his alternating current poorly – he died in poverty at the age of 87 in New York. His biggest competitor and direct current defender Edison, however, made a fortune during his lifetime. Irony of fate: technical development proved Tesla right. Today, alternating current is widely used to supply electricity.

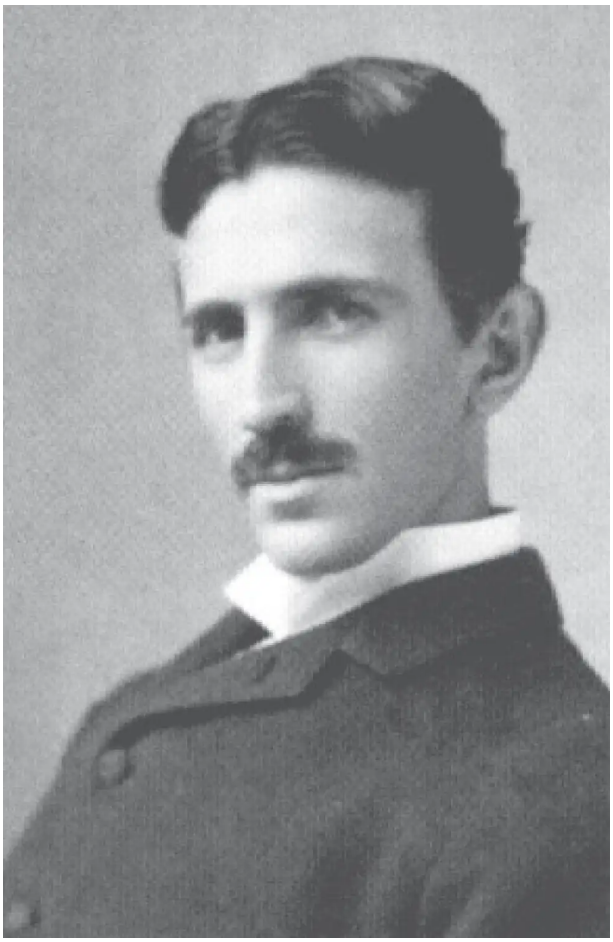

Fig. 1: Tesla at the age of 39.