

## High Voltage as a Hobby.

### ...Small Pictorial Review of some „Mad Scientist’s“ Toys

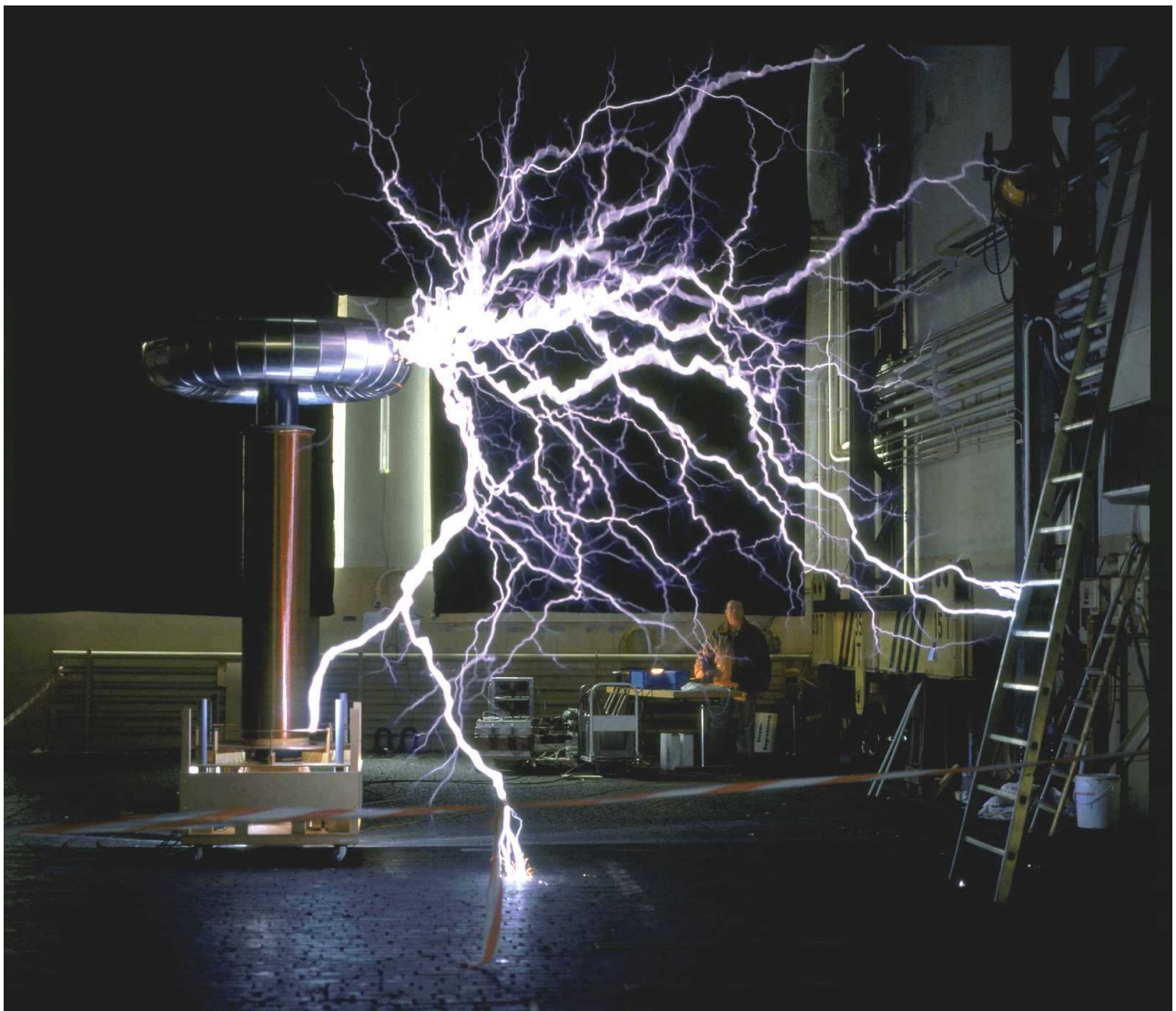
by Kurt Schraner, Electrical Engineer

For someone interested in physics (which is *not* the general case, nowadays!), high voltage experimenting *can* be a rewarding activity. Following are few of my „best“ pictures, taken during my retirement activities, on Tesla,-induction coils etc.

#### 1.) Tesla Coil „Black and White“

The name is not by accident: among other, it was chosen for a somehow political reason, as follows. Being myself „white“ and my dear wife, a real African origin, „black“, it says: all humeas on this little (or big, if you like) planet in the universe, are just humans!!!.. what’s the difference, let’s go together?

**Fig 1)** This coil is fairly big, and about the upper limit, an amateur may build, without financial support. It’s making „artificial lightning“-sparks up to about 4m length. Here it is in operation at the „Gundeldinger-Feld, Halle 7“ in Basel, Switzerland (the drwarf’ish guy in the background is yours truly, operating this lightning-machine):



**Fig.2)** Another spark picture of „Black and White“. Watching the background, you find me, holding an unconnected ordinary fluorescent tube in my bare hand, which is lit by the radio-frequency high voltage field of the coil, just in free space, through „the air“.



If you have a computer with Internet access, you may have more insight at my website:

<http://home.datacomm.ch/k.schraner/index.htm>

Small movies (well, of minor quality, but downloading fast), of my Swiss-TV events , can be had at:

[http://real.sri.ch/ramgen/sfdrs/chak/2002/chak\\_10092002.rm?start=0:16:26.253&end=0:21:06.125](http://real.sri.ch/ramgen/sfdrs/chak/2002/chak_10092002.rm?start=0:16:26.253&end=0:21:06.125)  
[http://real.sri.ch/ramgen/sfdrs/chak/2003/chak\\_09302003.rm?start=0:13:32.348&end=0:18:08.284](http://real.sri.ch/ramgen/sfdrs/chak/2003/chak_09302003.rm?start=0:13:32.348&end=0:18:08.284)

Well, a higher speed internet access would be nice! The second movie was taken at my home place.

**Fig.3)** Photo, taken by my wife Margaret, on occasion of presenting the B&W coil in Swiss TV news magazine „Schweiz aktuell“, November 4<sup>th</sup> 2002. Interviewer Thomas Schäppi talking to me and my coiler friends Andy Saile and Martin Damev (left to right, at my operator desk).



**Fig.4)** Here again B&W, during construction phase, in our living room. It may give an idea about size, and why my wife is jokingly talking about my stuff as „*your catastrophe*“... !



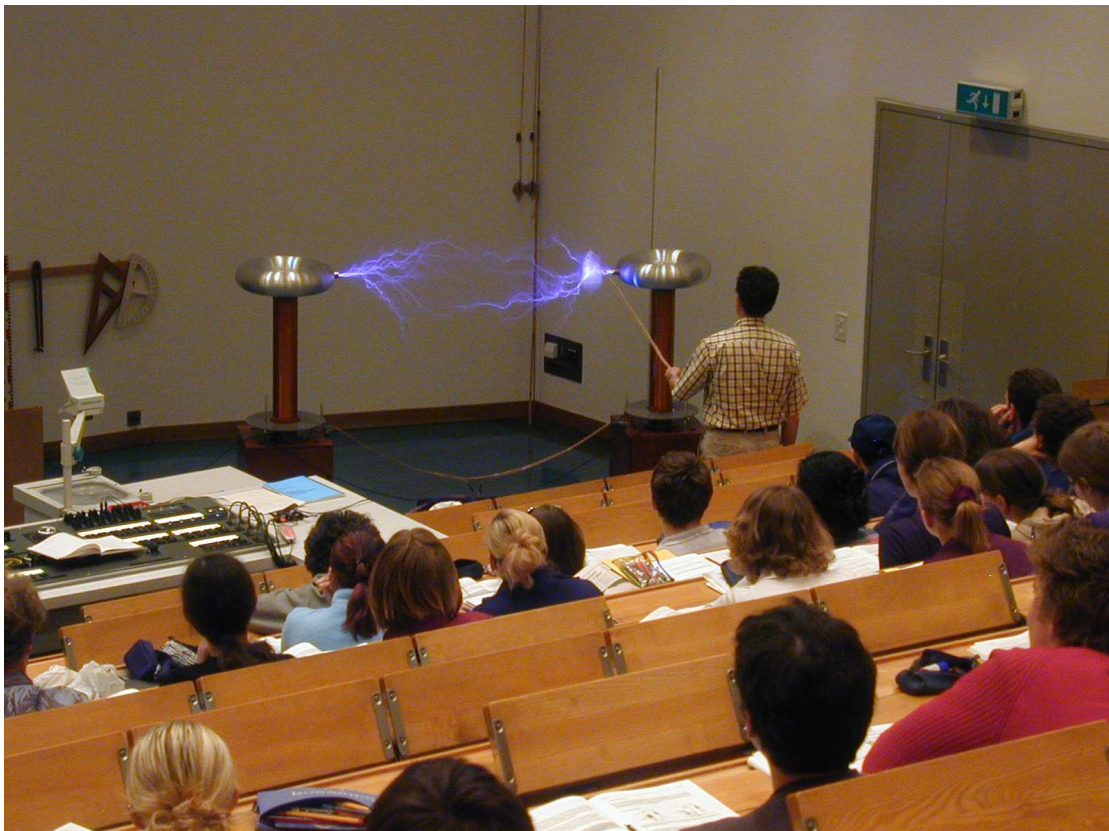
## 2.) University of Bern Tesla Twin System (the UBTT)

This little, but pretty coil I've designed and constructed for the use in lectures at the Applied Physics Institute of the Bern university.

**Fig.5)** Here you see my friend and project partner Urs Lauterburg and me, during test runs of the UBTT in the auditorium of the Physics Institute. Everything went nice, and we had a good time.



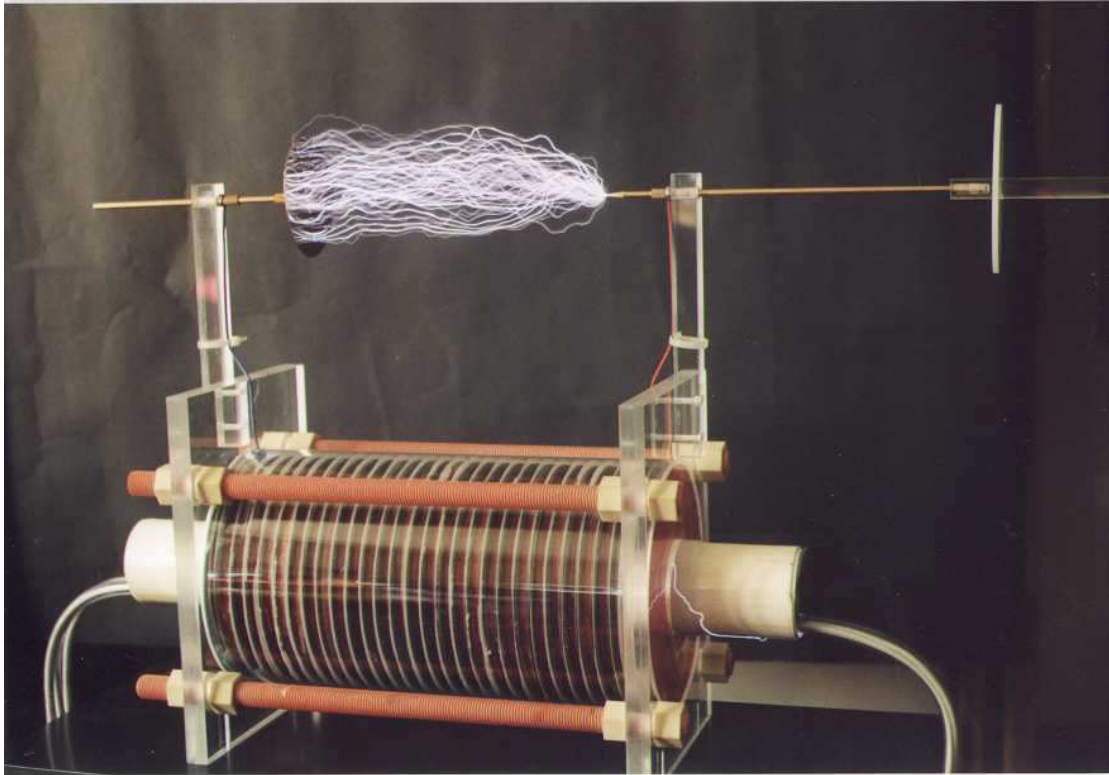
**Fig. 6)** Physicist Professor Dr. Thomas Stocker presenting experiments with the UBTT to the students. (The presentation of the coil ranged in the student polls as a premium highlight of the lecture demo's.)



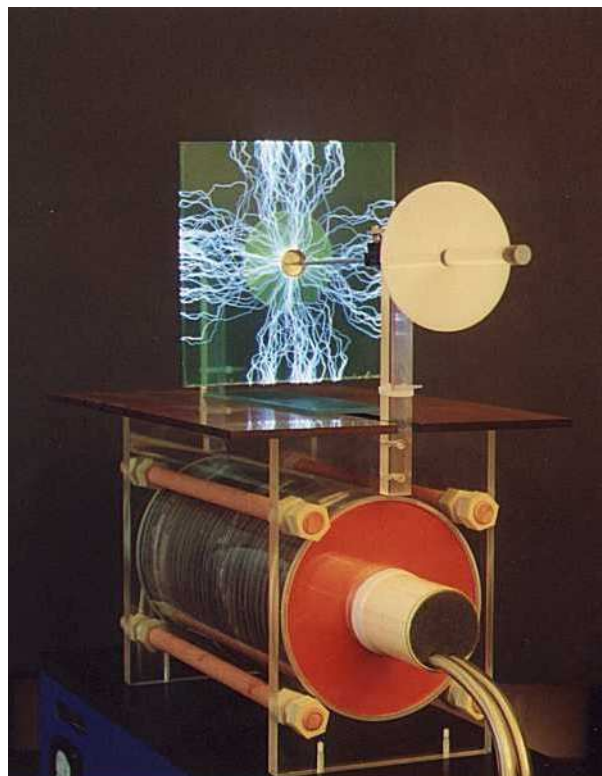
### 3.) Spark Induction Coils

...are just another old fashioned device (invented ~1850), which has attracted our interest, especially the one of my coiler buddy Andy Saile. We operate them by means of nowadays electronic solid state drivers, of which Andy has pushed the homebrew development quite a bit, to some limit.

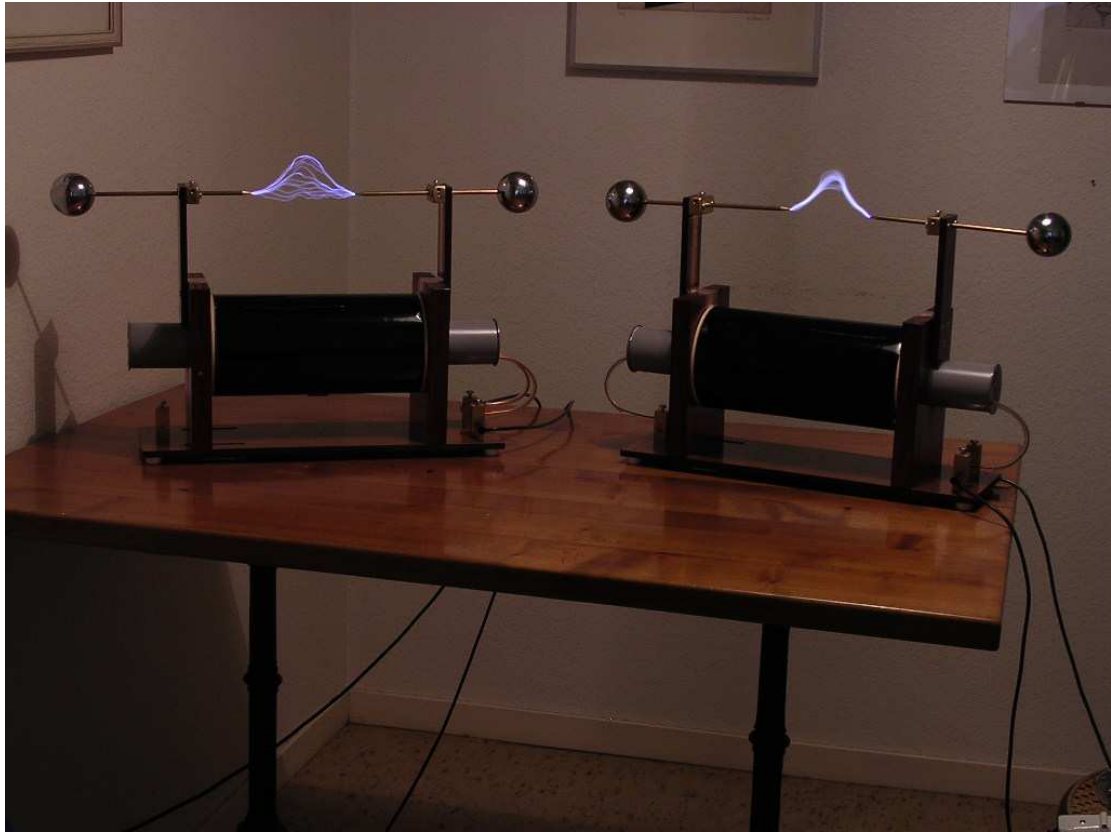
**Fig. 7)** Here you see the first of my induction coils, sparking 25cm. The primary winding is 205 turns of heavy wire on an iron core, while the secondary features about 42'000 turns of thin wire (~17km!)



**Fig. 8)** The same induction coil is shown here, sparking around an inserted 5mm thick acrylic disk. The discharges don't take the short 5mm way, punching the disk, but „prefer“ to go around.



**Fig. 9)** Having gained some experience with induction coils now, we decided to build 2 more of them, smaller and more handy for experiments, in 2004. The 2 finished coils, sparking on our kitchen table:



**Fig. 10)** I've pushed my coil up to 15cm sparks, between point electrodes (as active above). But in this next picture, you see Andy watching discharges between 5cm balls, which are short, but more controlled, regarding estimation of spark voltage.



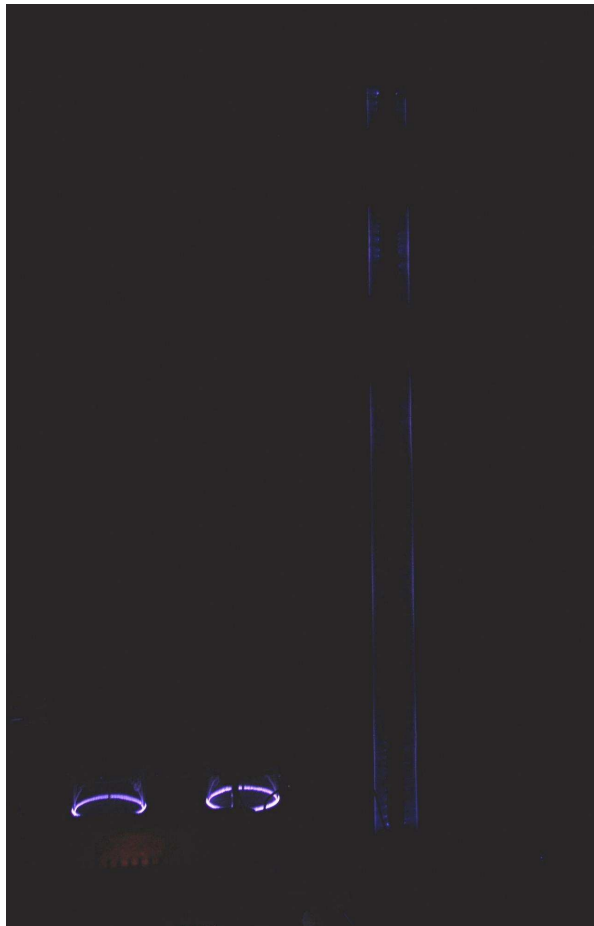
#### 4.) The Seibt-Coil Experiment

While not being spectacular, like a Tesla coil, the Seibt experiment is rewarding, visualizing in a very basic original display, the nature of radio waves. A Seibt coil is a very tall, thin resonator (you may compare it to a mechanical steel-blade, clamped in a vice), paralleled by 2 grounded wires, excited by high voltage radio frequency, which exhibits so called standing-waves along the coil, showing them by forcing low energy „spray discharges“ (=corona zones) between the coil and the wires. I've buildt one, and it is working! See my setup. well, sorry for the technical jargon! Here are pictures:

**Fig. 11)** A somehow chaotic view to my „mad scientist's lab“, with the Seibt coil in the center.



**Fig 12.)** Here you may look at the standing wave corona zone effect, along the Seibt coil. In order to observe the phenomenon, the room must be really dark. Mama Margaret calls this „your sick coil“, because of missing „big bangs“. But that's not the point, because faint discharges are to be expected!



## 5.) Vacuum Pressure Gas Discharge Tubes

Electrical discharges in low pressure gases have played an important role in the development for our present understanding of the atomistic nature of matter. These so called cathode ray tubes give beautiful experimental effects, when high voltage is applied to their electrodes. The danger of generating X-rays, however, needs to be taken care of.

**Fig. 13)** Here we have a Crookes „Malteser-Cross“ tube. The cathode rays (=electrons) throw a shadow picture of the metallic cross, on the glass wall, opposite to the cathode-electrode.



**Fig. 14)** This is a so called Railway-Tube. A small, very lightweight, metallized mica bladed wheel is moving along the tube, when the high voltage is applied.



## 6.) Postscript

With the exception of the gas discharge tubes, all apparatus presented was designed, realized and successfully put to operation by me, Kurt Schraner, during my retirement since 1999. Of course I must not forget to mention the many creative discussions and help (by hands or scrounged materials) of my friends Andy Saile and Martin Damev. I'm yet happy with these „physics history- and present“ oriented activities, and look forward, what is going to come... You must do something interesting in your life!