Historic physics instruments at the University of Lausanne

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SUMMARY:

Any comment, suggestion or correction is welcome

Internet access: http://lphe.epfl.ch/engl/publications/

I. Institutional framework and history of the collection

1536 Bern conquers the Pays de Vaud
The Protestant Reformed religion is imposed on the population
1537 Foundation of the *Académie de Lausanne*,
with the sole purpose to train parsons

Until 1837, three-tiers curriculum:
— *Belles-Lettres* (sometimes called *Eloquence*)
— Philosophy
(including what is taught of mathematics and physics)
— **Theology**

Lausanne in 1855:
The old town seen from the east.
The Académie building is located
on the far side, between the
Cathedral (left) and the Château (right).

1798 The Bernese baillifs are expelled — independence of Vaud
1803 Vaud becomes one of the cantons of Switzerland
1806 *Académie* with two Faculties: Theology and Law
After several short-lived organizational changes:
1869 *Académie* with five diploma awarding Faculties:
Theology, Law, Litterature, Sciences, Technology
1890 The *Académie* becomes an University (UNIL)
Admission of women
216 students
Creation of new Faculties, beginning with Medicine in 1890

1910 1000 students, as many as 2/3 of them being foreigners

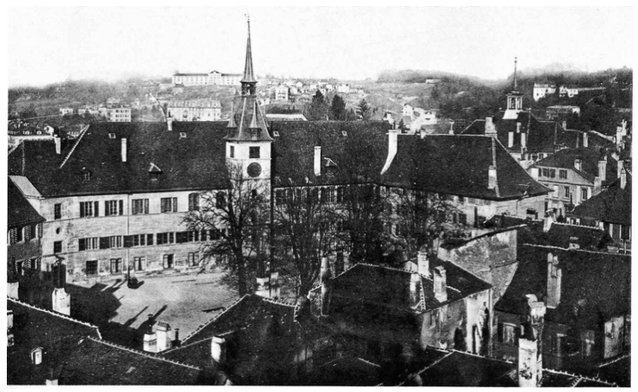
1969 The EPUL (the Technological Faculty of the University, later Ecole d'Ingénieurs and eventually Ecole Polytechnique) is transferred to the Confederation and becomes the EPFL
1970 UNIL begins to move to a new campus out of town,
on the shore of Lake Geneva
3000 students

2004 More than 10'000 students at UNIL, more than 6000 at EPFL

1776 The first professor of Experimental Physics, J.-S. FRANÇOIS, comes from Leyden with his personal collection of about 100 instruments
First *Cabinet de Physique*
After his death in 1800, experimental physics is taught
by a single professor until 1953.

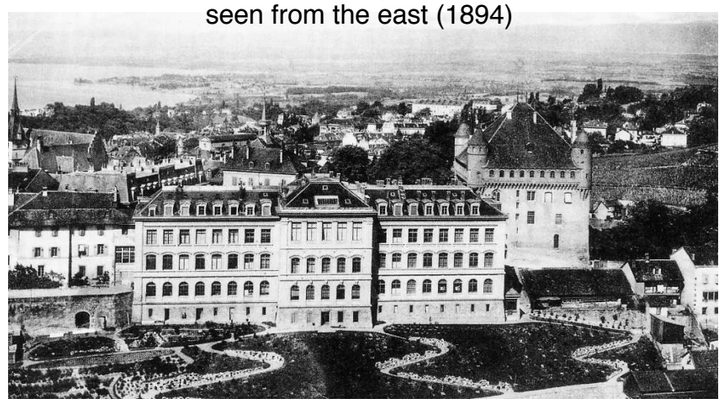
1882 Establishment of the *Laboratoire de Physique Expérimentale*

1893 Inauguration of the *Ecole de Physique et de Chimie*, a new building close to the old Académie building



The old Académie building,
seen from the spire of the Cathedral

The Ecole de Physique et de Chimie
seen from the east (1894)



1973 Physics moves to the new campus
2003 Physics is transferred from UNIL to EPFL

II. The collection of instruments

— INVENTORY

Time limit: about 1950.
Electronic instruments with more than one vacuum tube, as well as most instruments built after 1950, will be stored in a “Purgatory”.

Survey completed: roughly 500 objects.

Inventory still in progress, but no new major discovery expected.
Already 294 FileMaker Pro 6 records
(one record may include several identical or nearly identical objects).

Each record includes 1 to 3 photographs, a description and, when possible, reference to original publications in scientific periodicals, old physics books or manufacturers’ catalogs (the item most difficult to find).

Most objects from before about 1880 bear no inscription, making the dating even more problematic than for more recent ones.

— THE INSTRUMENTS (demonstration and laboratory)

The best represented fields of physics are
- — Space, Time, Weight, Density measurements
- — Sound
- — Electricity & Magnetism
- — Optics
- — Radioactivity and X-Rays

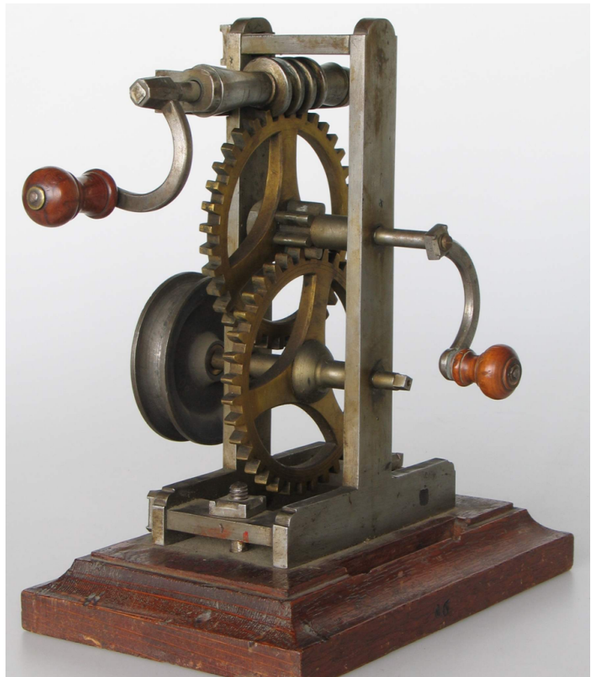
Also present are
- — Solid & Fluid Mechanics
- — Heat (many thermometers!)
- — Electrochemistry and Physical Chemistry

- — A few « *vistemboirs* » (Antiquarian French for an object without identifiable purpose)

Astronomy, Surveying, Navigation are absent

EARLY DEMONSTRATION MODELS

Gears (height 265 mm)



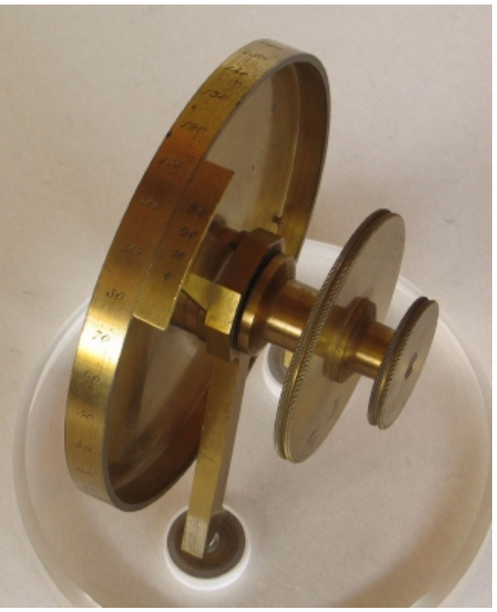
Pile-driver (h = 500 mm)

Stress induced birefringence
Soleil Fils (Paris)
(l = 158 mm)

Eye (h = 280 mm)

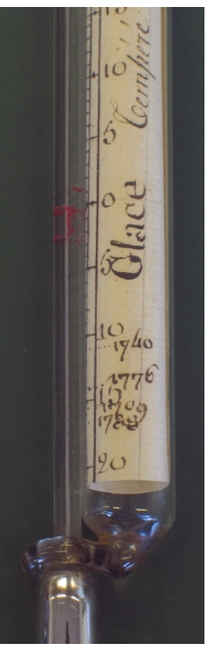
III.1. Instruments made before about 1850

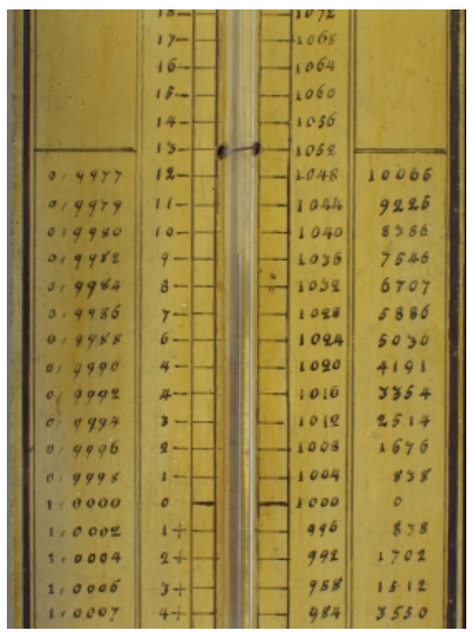
Wollaston's goniometer
Kruines (Paris)1809-1822
(Ø 114 mm)
Crytal holding arm
and base missing



Regnier's dynamometer
Invented 1798 (Paris),
Tested in Lausanne in 1841
(spring length 310 mm)

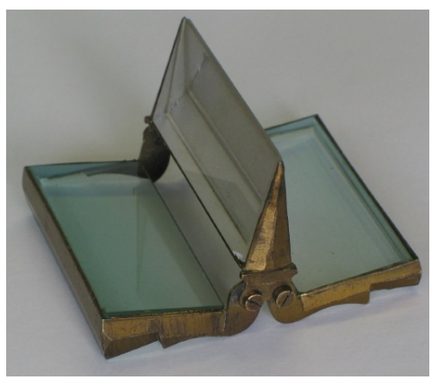
Apparatus to demonstrate polarisation phenomena,
including black glass mirrors, pile of glass slides,
parallelepipedic prism, etc.
Probably French, undated
(circle Ø 200 mm)





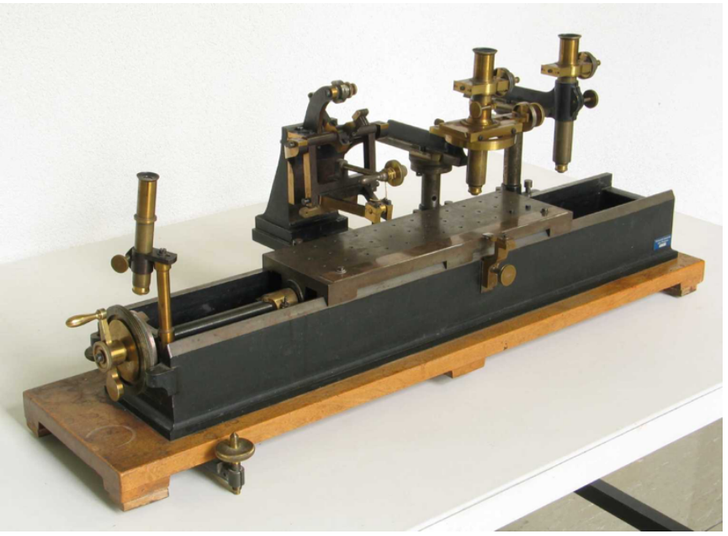
Two unbroken mercury thermometers (details)
Far left, made by Mossy (Paris) showing the temperatures of some cold winters at the end of the XVIIIth c. (including 1789)
Left, with G. E. Rosenthal (1745-1814) scales (hot is negative, cold is positive, zero is not the freezing point of water !)

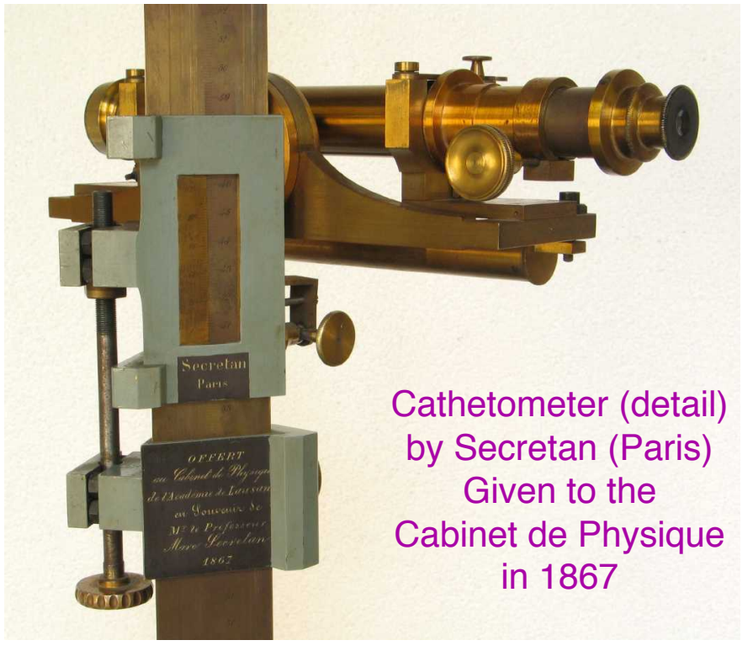
Achromatic prism,
Dollond (London)
1760-1780
(l = 44 mm)



III.2 Space & Time; Mechanics

Ruling machine by SIP (Geneva)
Early XXth c.; at UNIL in 1923
(l = 940 mm)





Cathetometer (detail)
by Secretan (Paris)
Given to the
Cabinet de Physique
in 1867

Hipp's chronoscope
M. Hipp (Neuchâtel)
End XIXth c.
(h = 600 mm)

Small theodolite (?) by Meÿerstein (Göttingen)
(circle Ø 118 mm)
Telescope missing

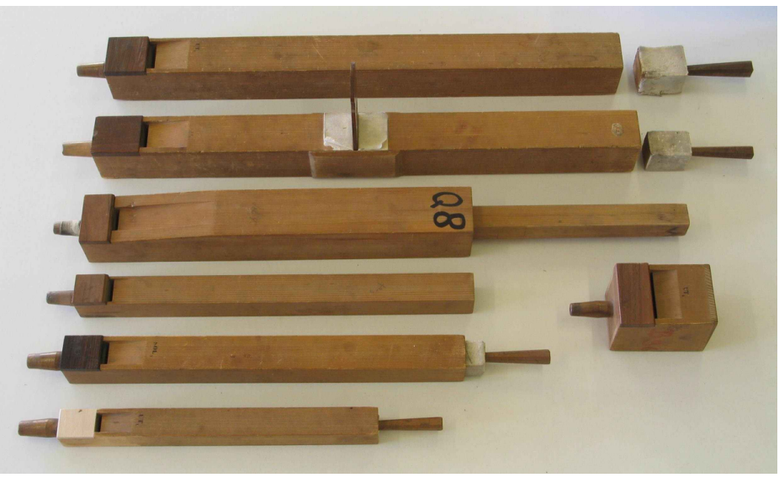
Set of gyroscopes by J. Kern (Aarau)
Given to the Cabinet de Physique in 1876
(wheels Ø 98 mm)

Demonstration scale by Alb. Rueprecht (Wien)
After 1882
(h = 740 mm)

III.3. Sound

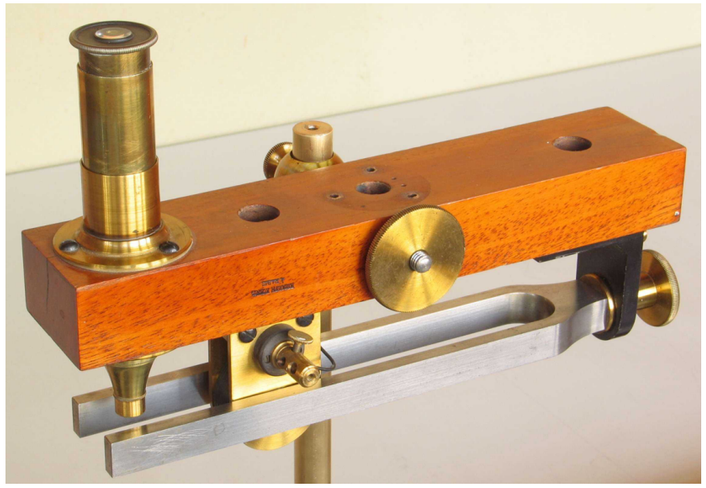
Galton's whistle according to Th. Edelmann
German; after 1900
(l =150 mm)

Helmholtz double siren
R. Kœnig (Paris)
(h = 470 mm)



Set of 7 organ pipes
by Marloye (Paris)
(lengths from 140 to 650 mm)

Electrically driven tuning fork
R. Kœnig (Paris)
(total length 280mm)
Note the stationary microscope



Set of 10 tuning forks with resonator
R. Kœnig (Paris)
(total heights from 595 to 140 mm)

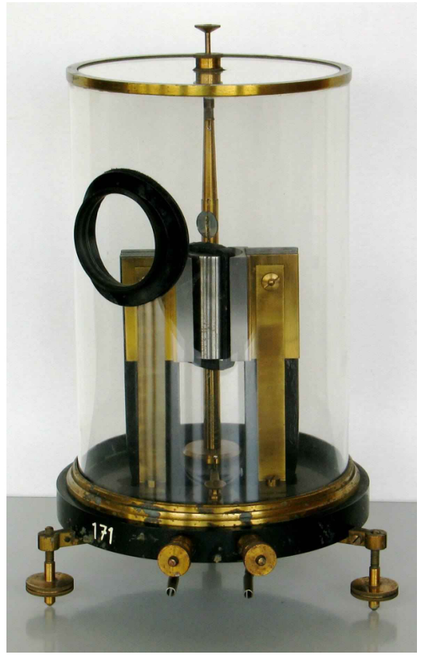
Crova's disk with holder
Max Kohl (Chemnitz)
(h = 200 mm)
Terquem's plate not shown

Harmonic analyser (Kœnig pattern)
J. Lancelot (Paris)
(h = 1050 mm)
Manometric flames missing

III.4(1). Electricity & Magnetism: Late XIXth / early XXth century galvanometers

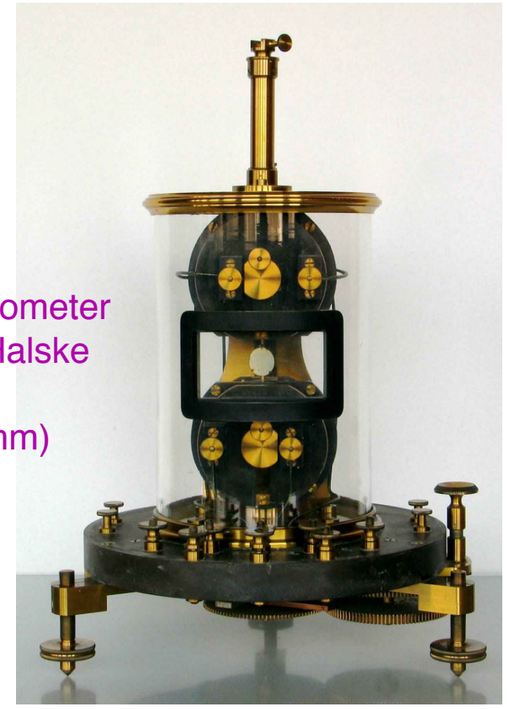
Magnetic needle galvanometer
(cylinder Ø 94 mm)

Moving coil galvanometer
J. Carpentier (Paris), after 1889
(h = 310 mm)



Astatic galvanometer and accessories
At. Ruhmkorff – J. Carpentier (Paris)
(box height 230 mm)
On the top, box with magnetic needles
and suspension threads
Compensation magnets lost

Astatic galvanometer
Siemens & Halske
(Berlin)
(h = 370 mm)



Demonstration moving coil V-/A-meter
Hartmann & Braun (Frankfurt a.M.), after 1897
(h = 340mm)

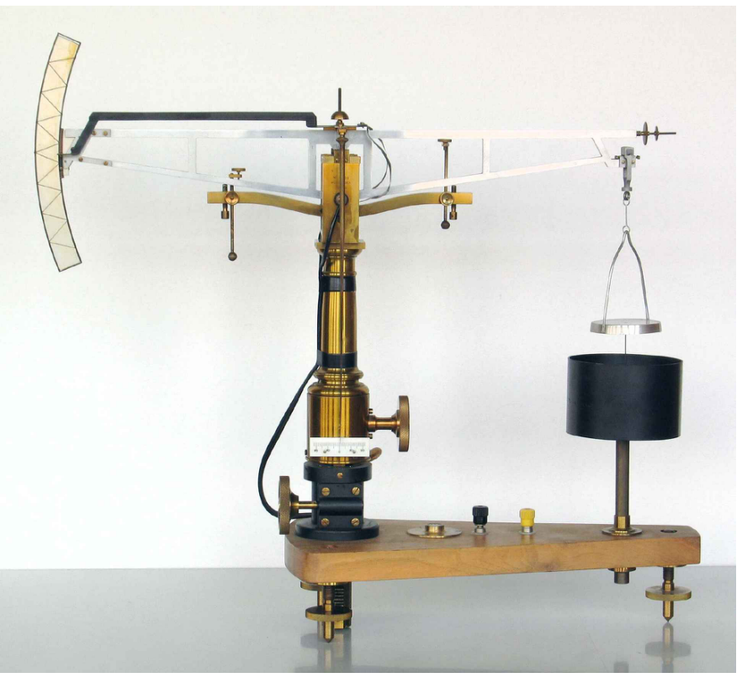
III.4 (2a). Electricity & Magnetism: Potentiometers

J. Carpentier (Paris)
(l = 520 mm)

Hartmann & Braun (Frankfurt a. M.), 1900-1908
The reference is still a Clark element
(width 370 mm)

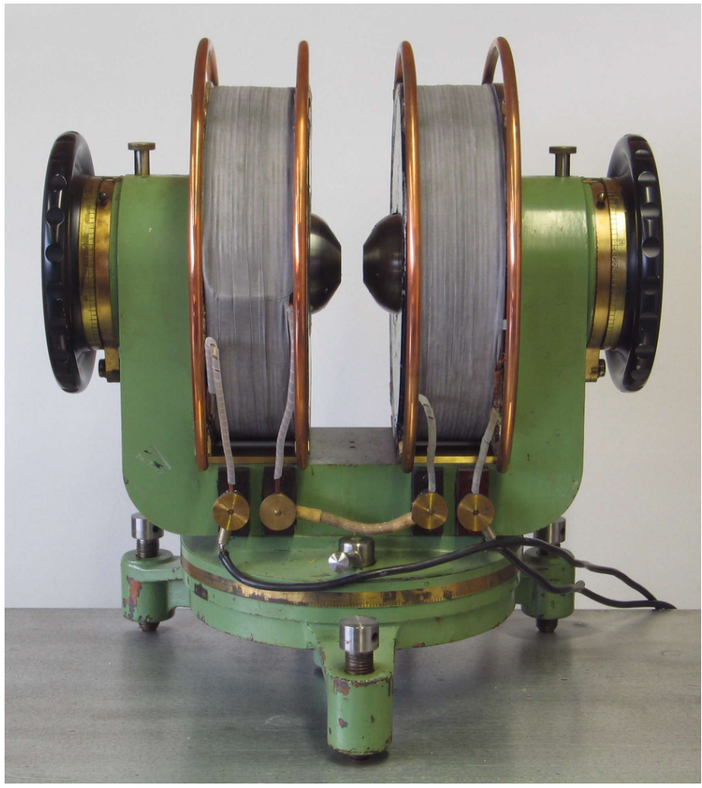
« Thermokraftfrei » after Diesselhorst,
with Auxiliary Resistors Box, Switch and “Multiplicator”
O. Wolff (Berlin), after 1908
Pot. length 450 mm

III.4 (2b). Electricity & Magnetism: Magnetic field



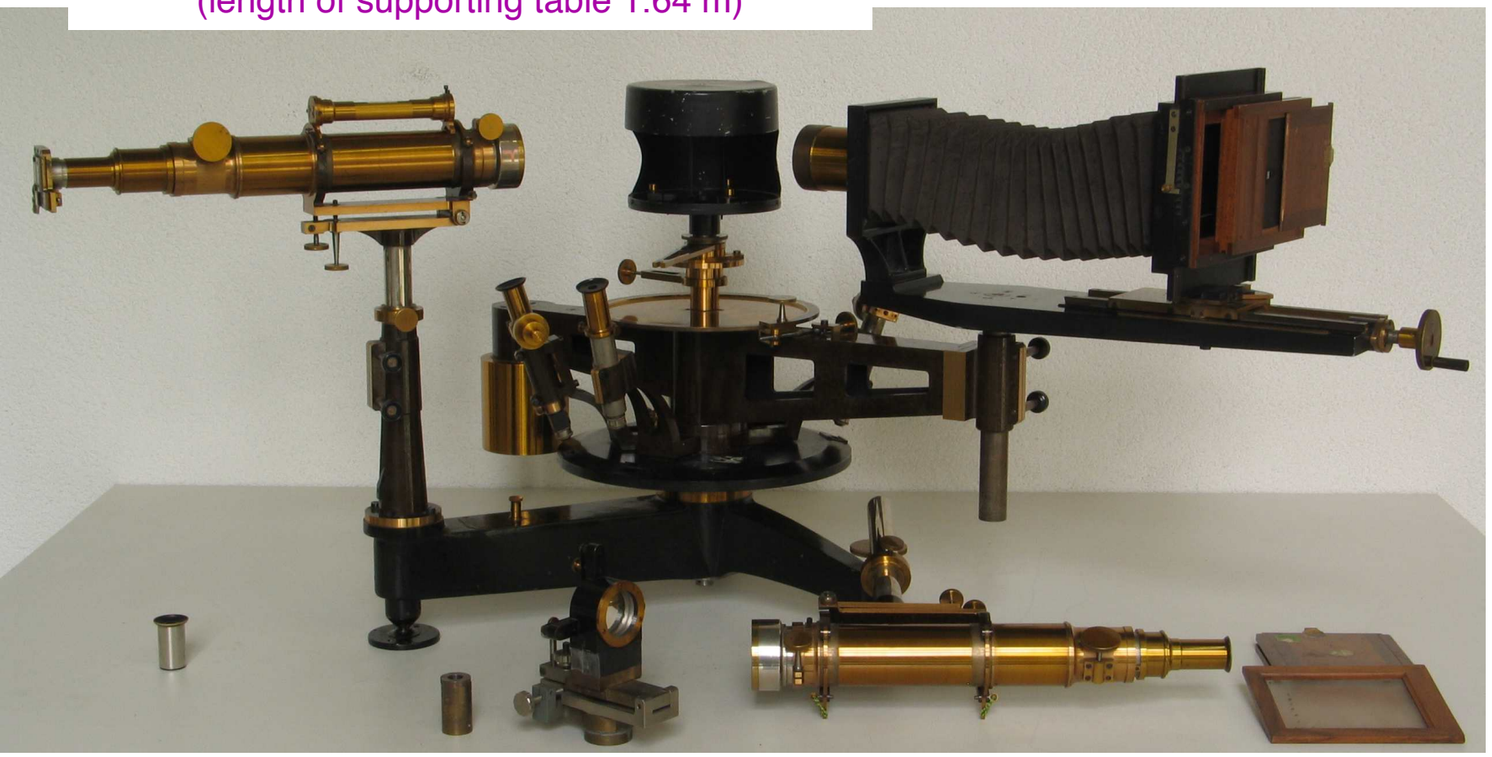
« Balance de Cotton »
W.G.G. Weber (Zürich), after 1900
(h = 510 mm)

Electromagnet system Weiss
SIP (Geneva), after 1907
(pole Ø 90 mm)
In use until last year



III.5 (1). Optics: Spectroscopes & Spectrographs

Two-arm spectroscope / spectrograph
SIP (Geneva), after 1913
(length of supporting table 1.64 m)

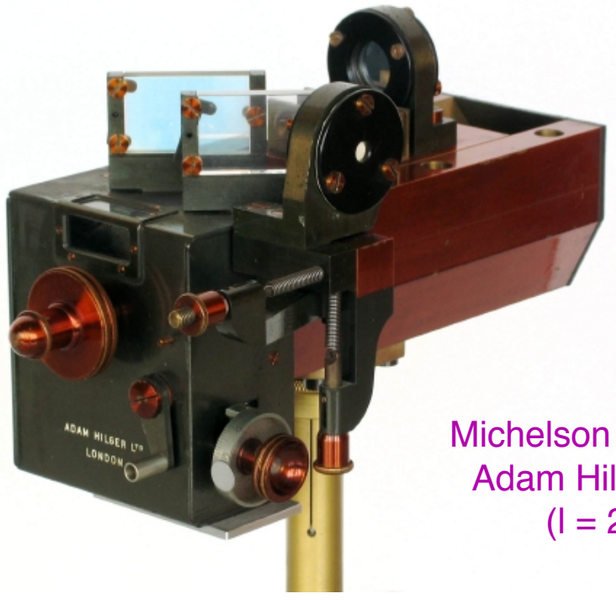


Two-prism spectrograph
Adam Hilger (London)

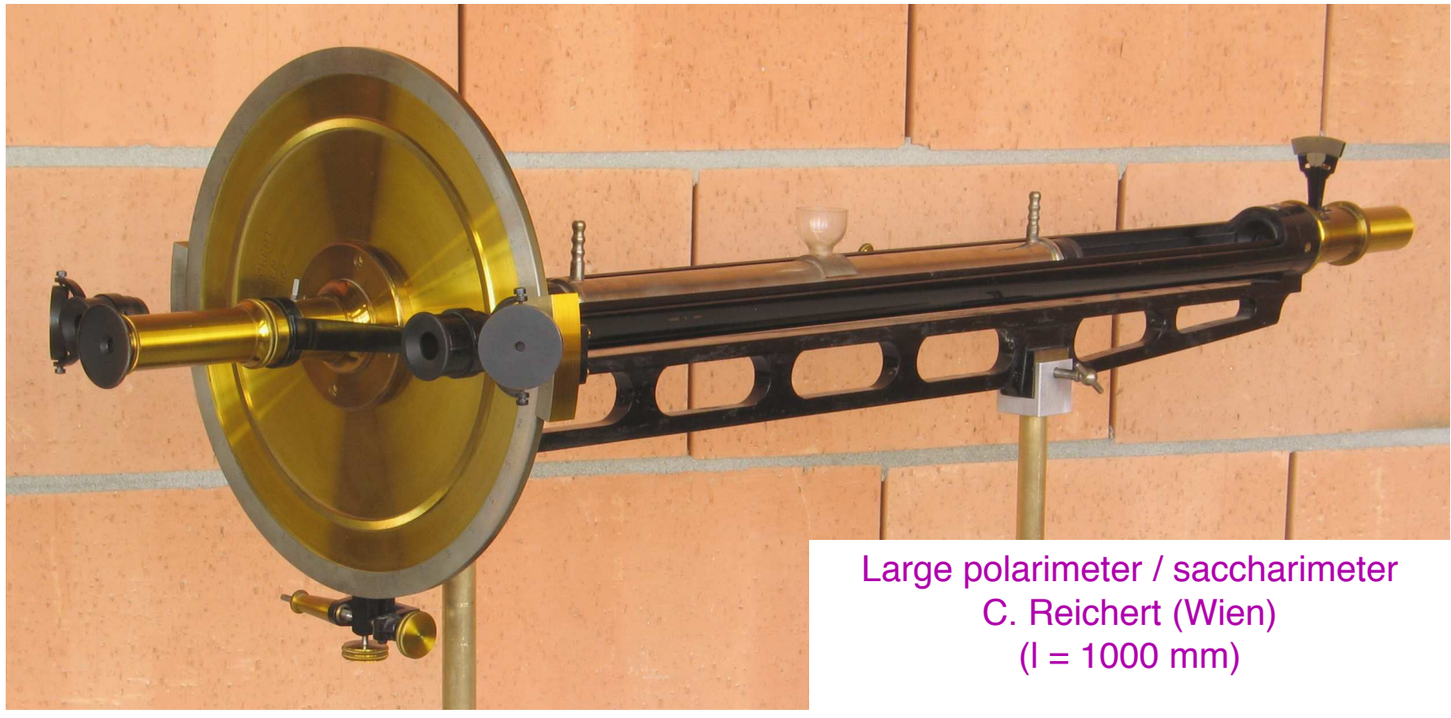
Metal diffraction grating
Rowland (Baltimore), 1888
14’438 lines/inch
(Ø 100 mm)

Direct-vision spectroscope
3 trains of 3 prisms
Jakob Merz (München)
(l = 480 mm)

III.5 (2) Optics: Some other instruments



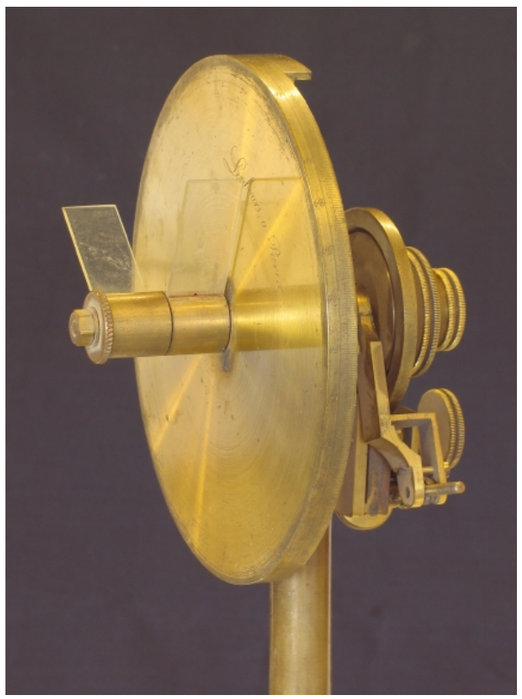
Michelson interferometer
Adam Hilger (London)
(l = 250 mm)



Large polarimeter / saccharimeter
C. Reichert (Wien)
(l = 1000 mm)

Pulfrich refractometer
Carl Zeiss (Jena)

Jamin's compensator
Lerebours (Paris), 1850-1870
(Ø 135 mm)

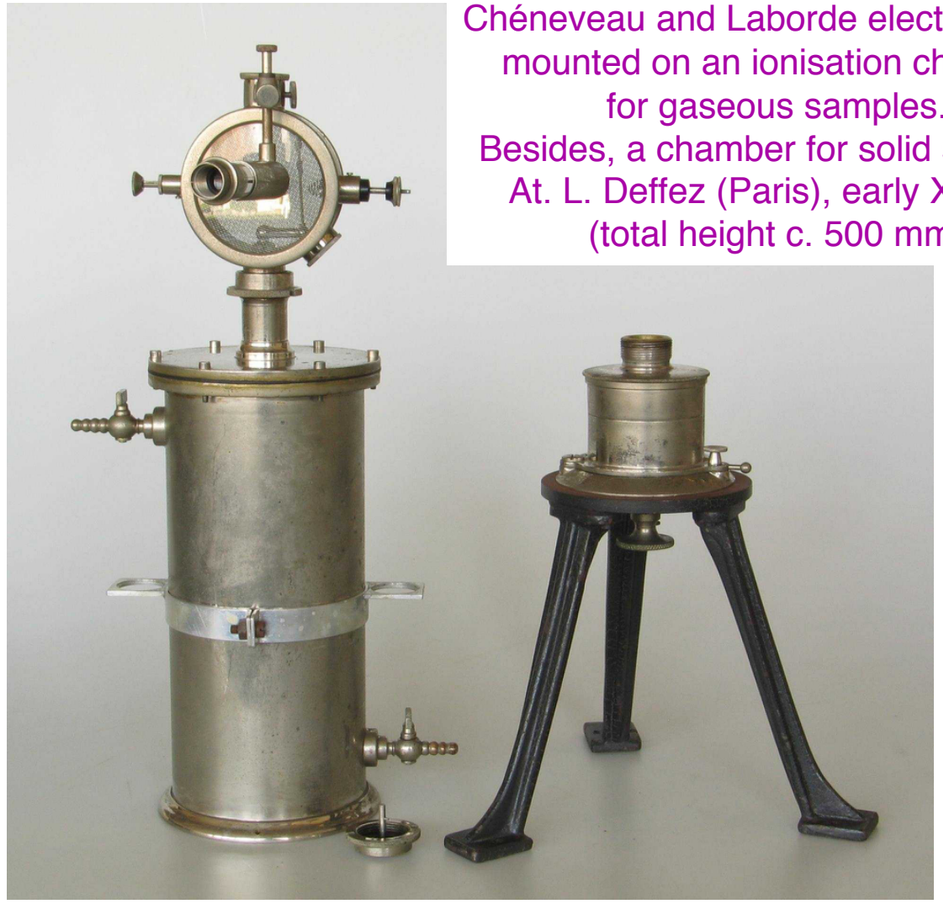


Stöhrer-Münchow oscillating prism
After 1876
(h = 280 mm)

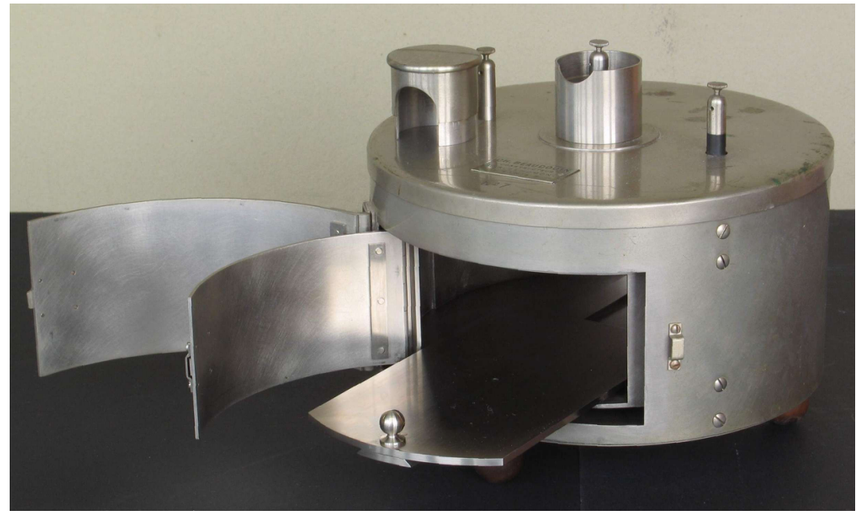
III.6 Radioactivity up to 1935

Piezo Quartz P. Curie
S.C.P.C. (Paris), early XXth c.
(h = 600 mm)
Quarz plate broken

Chéneveau and Laborde electroscope,
mounted on an ionisation chamber
for gaseous samples.
Besides, a chamber for solid samples
At. L. Deffez (Paris), early XXth c.
(total height c. 500 mm)

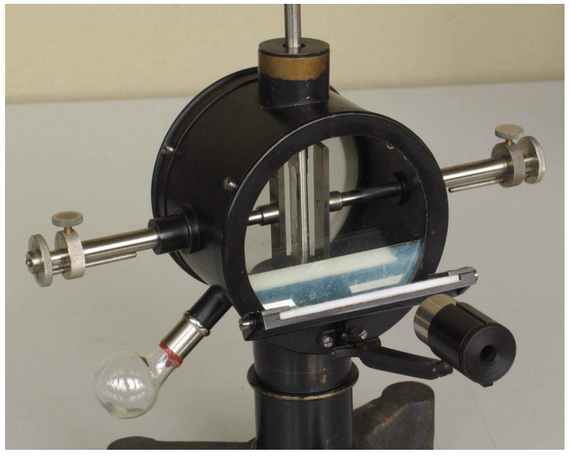


Parallel plates air ionisation chamber
Ch. Beaudouin (Paris), about 1930
(Ø 190mm)

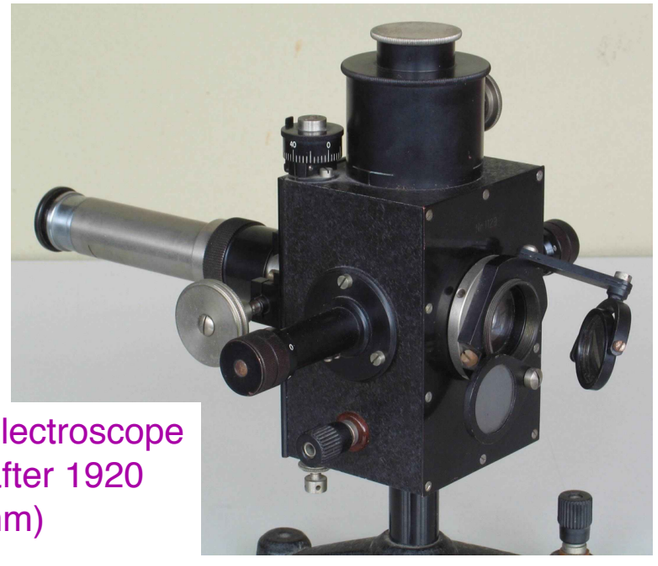


Wulf's coaxial capacitor
Leybold (Köln), after 1925
(l = 390 mm)

Exner electroscope with Elster-Geitel readout
Spindler & Hoyer (Göttingen)
(Ø 83 mm)



Wulf's single fiber electroscope
Leybold (Köln), after 1920
(h = 250 mm)



IV. Conclusions and future prospects

— ESTIMATION OF LOSSES

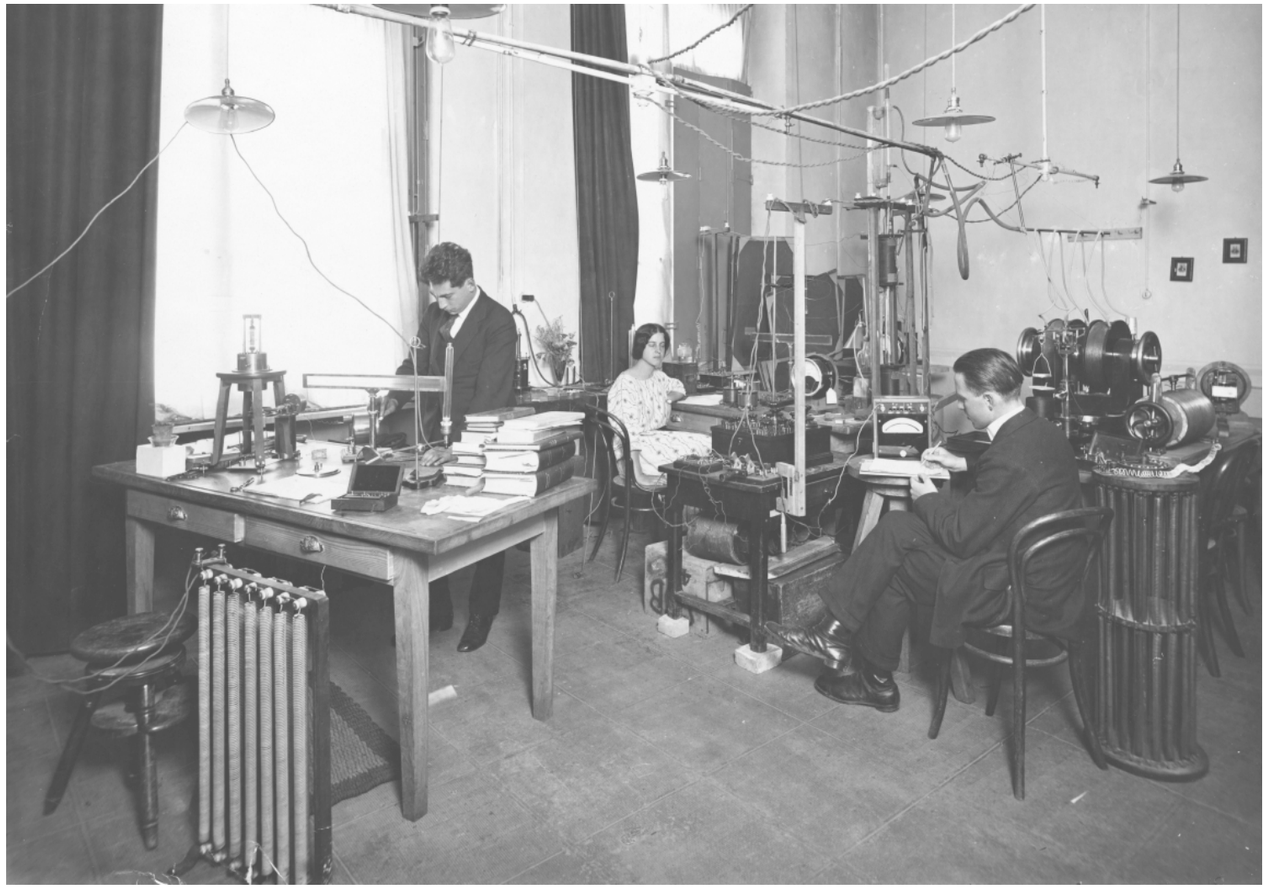
Nature and amount of losses are unknown, at least for the period before 1900, due to the unavailability of written inventories.

For the first half of the 20th century, four high-resolution photographs of the students laboratories, taken in 1923 show many objects then still extant, and many others now regrettably lost.

The successive moves were probably the main cause of losses:
- from the old *Académie* building to the new *Ecole de Physique* (1893);
- from the Old Town location to the new campus on the shore of the lake (1973);
- and finally, a few years ago, from large rooms behind the physics; auditoriums to much smaller store rooms, in the same building.

A few objects survived unexpectedly :

Drinking glasses, knife rest and necklace in uranium glass
The glass beads are the most radioactive objects



One of the laboratories at the Ecole de Physique et de Chimie in 1923
(photo de Jongh)

— FUTURE PROSPECTS

The transfer of the Physics Department from the UNIL to the EPFL at the end of 2003 provided the opportunity to clean up the students laboratories and to empty cupboards.
A permanent display located in the main hall of the *Bâtiment des Sciences Physiques* at EPFL will be open to the public; a selection of instruments will be shown.
After completion of the inventory, access by Internet to the records (« Virtual Museum ») is planned, but funding is hard to come by.
Short notices about a selection of objects could be included in the Online Register of Scientific Instruments (www.isin.org)
Still a lot a work ahead !

ACKNOWLEDGEMENTS: I especially wish to thank Sylvain GUILLAUME for his help during the often dirty work of reorganizing and cataloguing the collection, as well as Olivier ROBERT, head of the Records Office of UNIL, who provided the necessary funding.