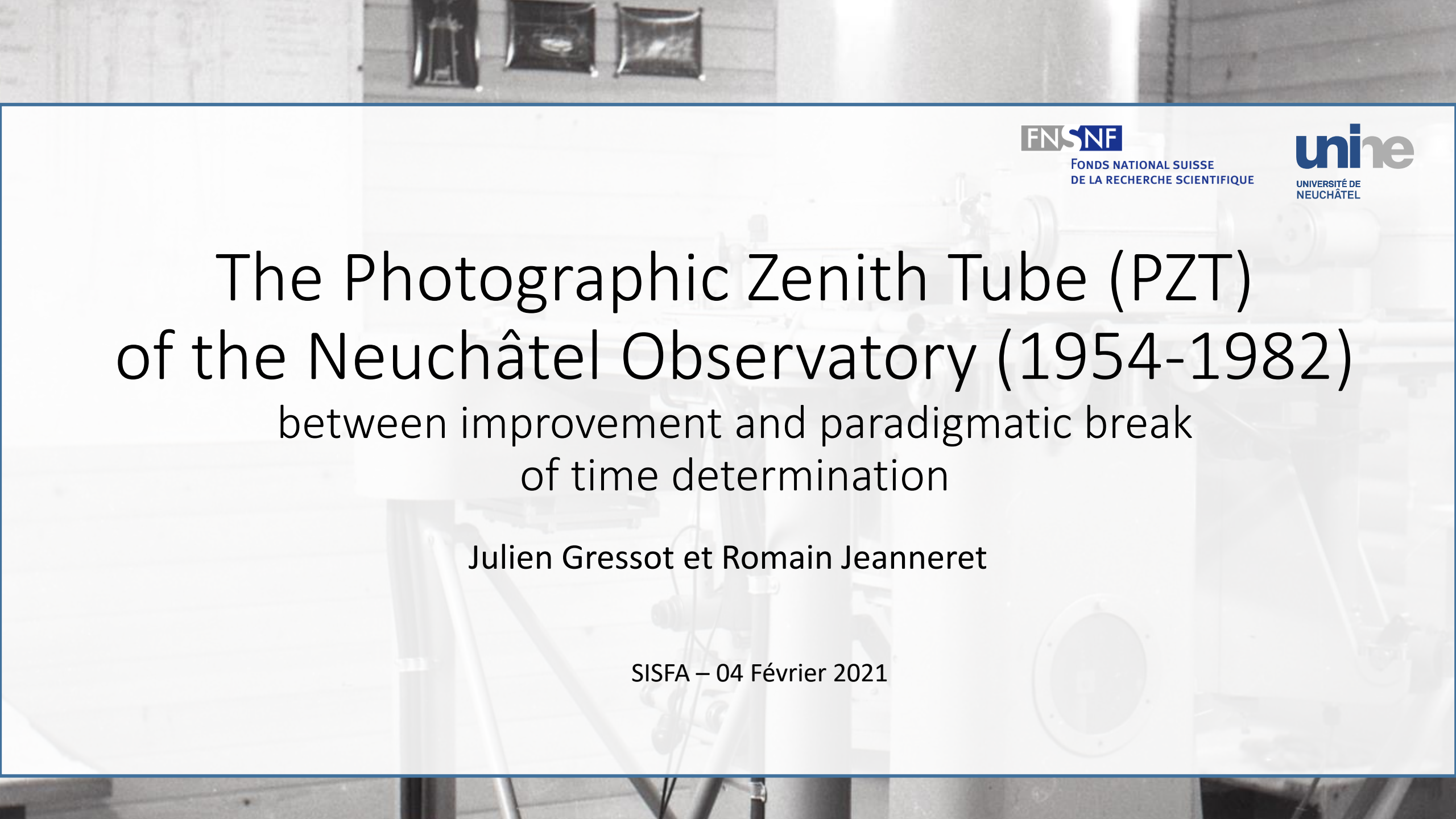

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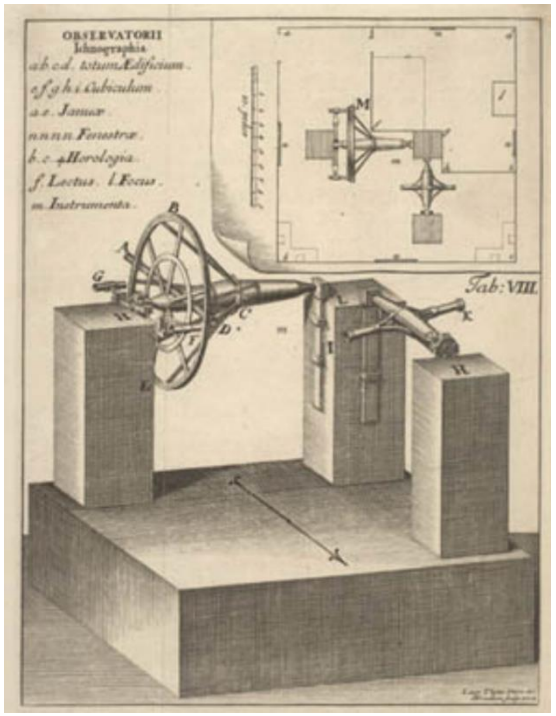
The Photographic Zenith Tube (PZT) of the Neuchâtel Observatory (1954-1982)

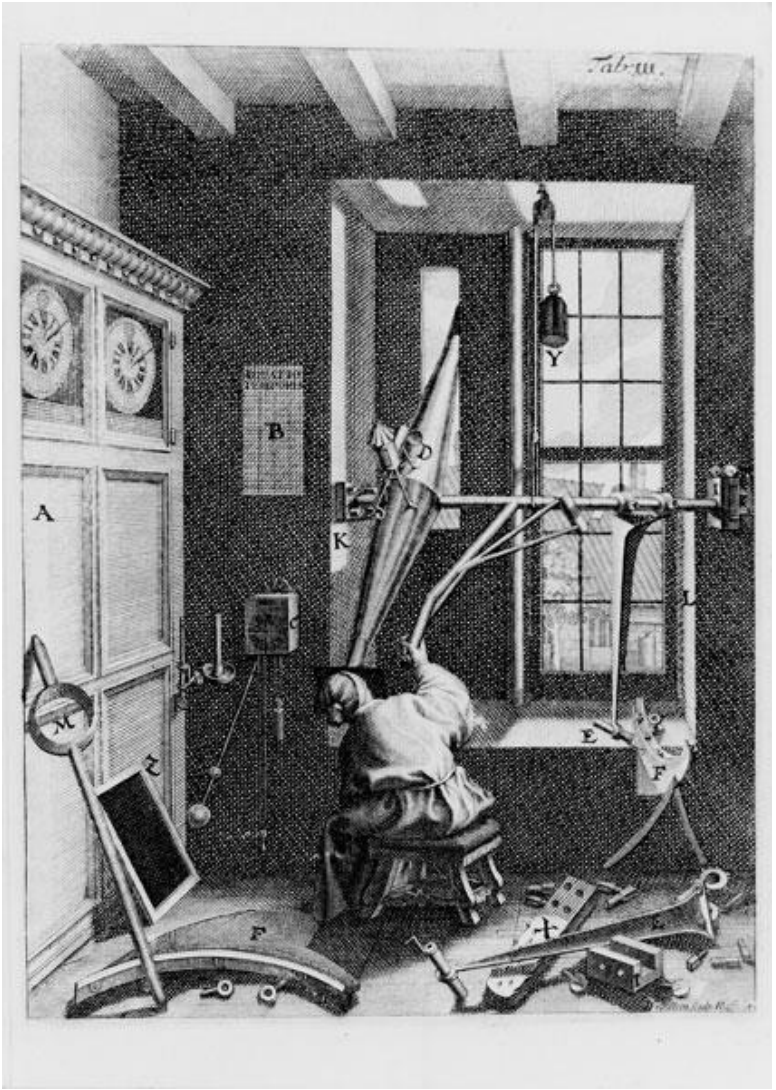
between improvement and paradigmatic break of time determination

Julien Gressot et Romain Jeanneret

SISFA – 04 Février 2021

Introduction





Roemer's « Machina domestica » or meridian telescope. Image taken from Peder Horrebow, Basis astronomiae sive astronomiae pars mechanica […]. - Havniae : apud D viduam beati Hieron. Christiani Paulli, 1735.

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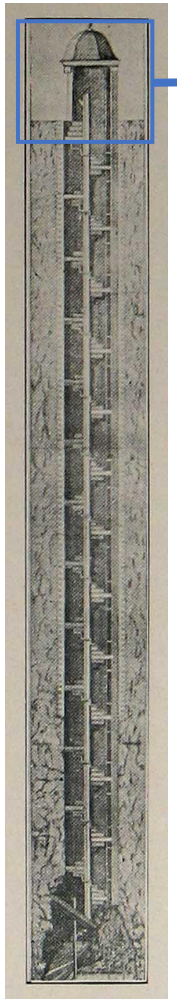
PLAN

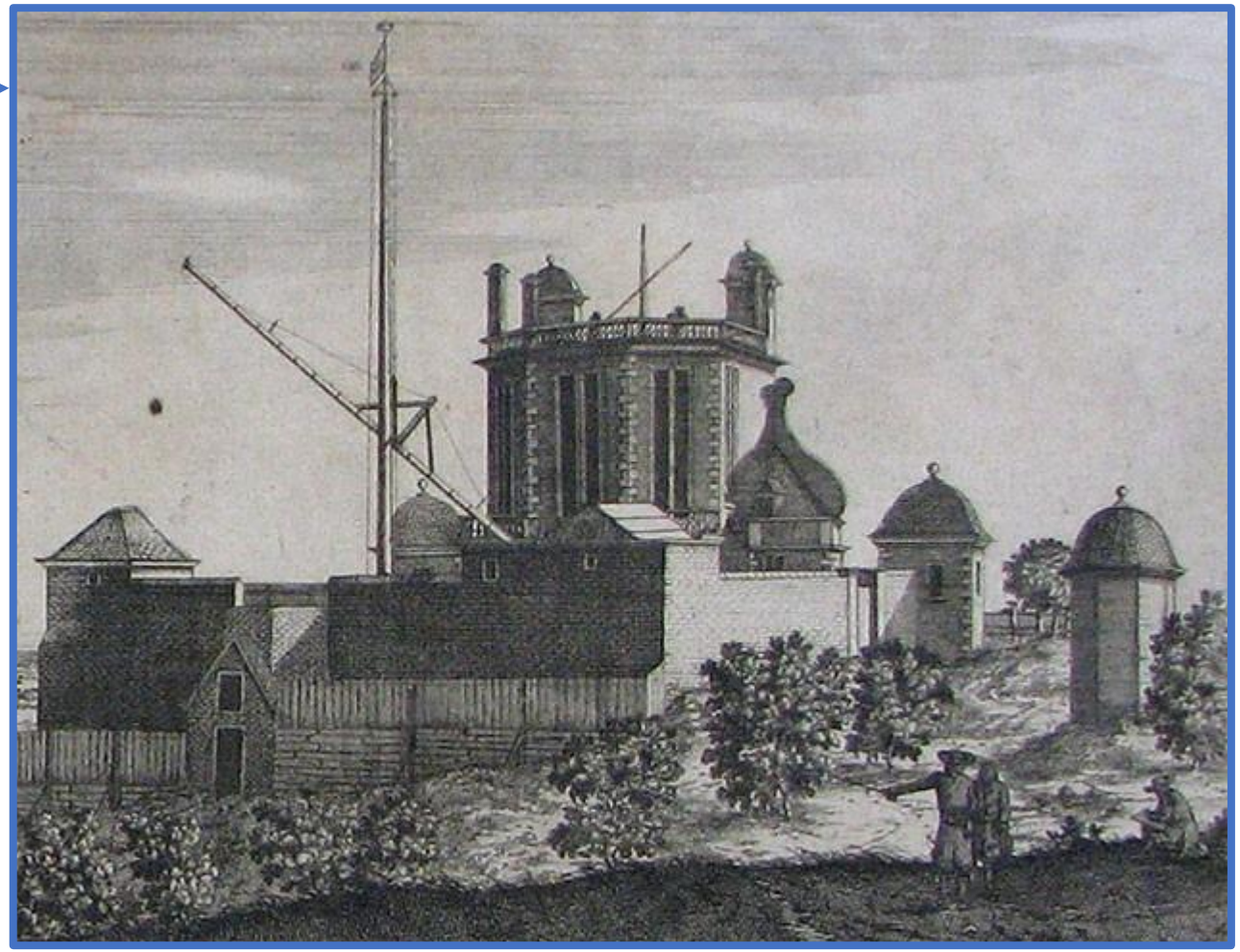
I Origins of the PZT
II Neuchâtel's PZT
III From Earth to Atomic Time
IV Conclusion

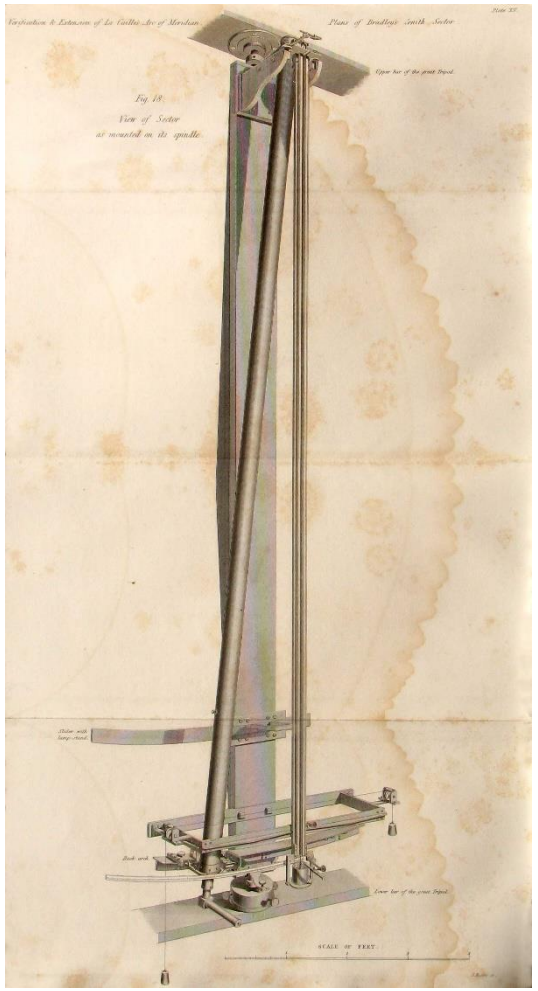
Detail of the Fresco by Hans Erni showing the PZT and Quartz, © MIH

17th century – First's zenith telescopes



Flamsteed's Well Telescope . From Webster's Greenwich Park its History and Associations (London, 1902)



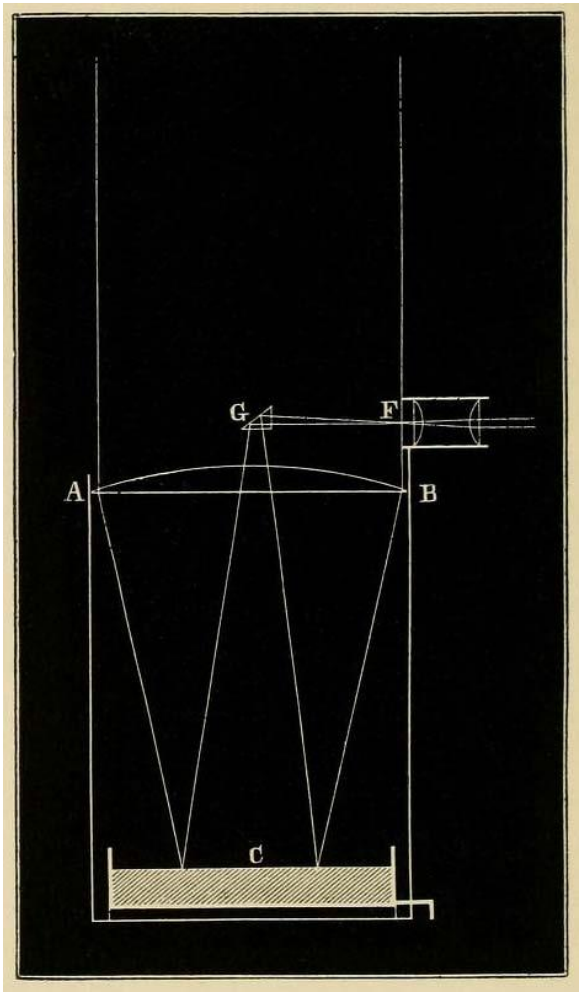


Bradley's Zenith Sector following the modifications made prior to sending it to the Cape in 1837. Plate XV from Volume 1 of Verification and extension of La Caille's arc of meridian at the Cape of Good Hope (1866)

1851 – AIRY'S REFLEX ZENITH TUBE (Greenwich)

The top section of Airy's Reflex Zenith Tube. Photo taken in the Science Museum storage in 2009

http://www.royalobservatorygreenwich.org

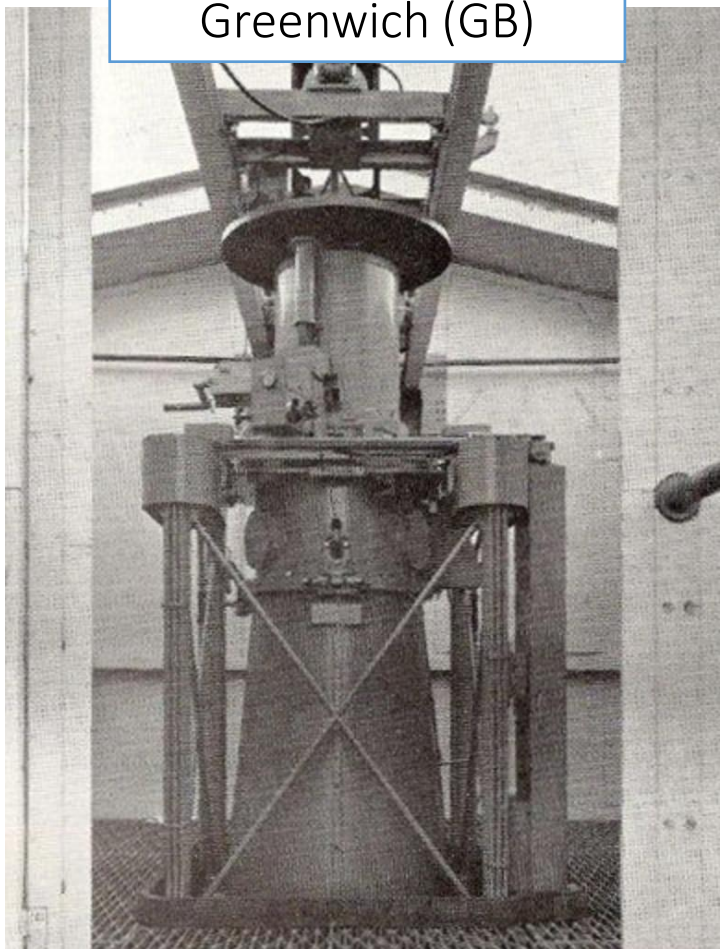


The principle of Airy's Reflex Zenith Tube. Fig. 131 from J Norman Lockyer's *Stargazing: Past and Present* (London 1878)

1911 - PHOTOGRAPHIC ZENITH TUBE (US NAVAL OBSERVATORY WASHINGTON)

1946 - UIA Copenhaguen

Greenwich (GB)

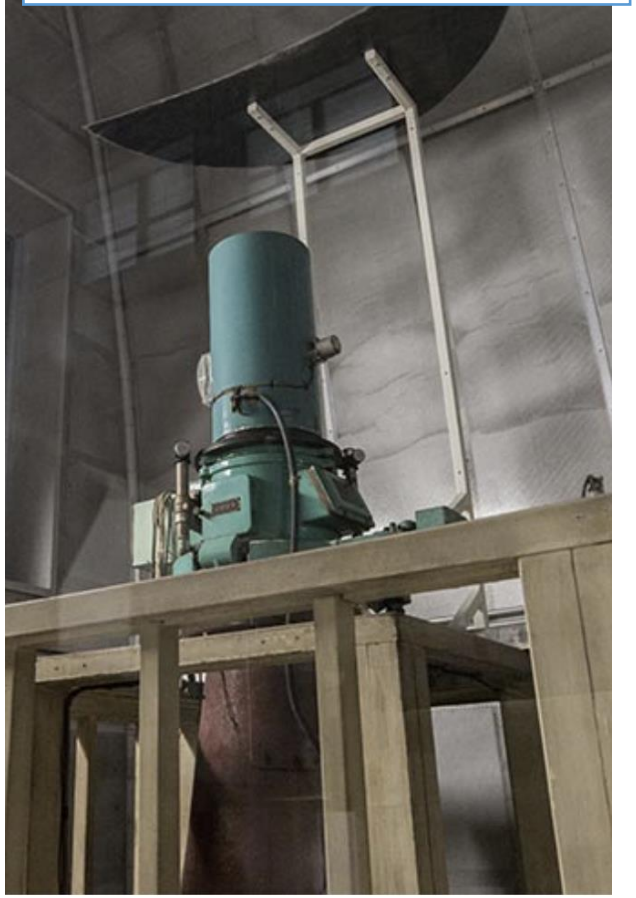


The Photographic Zenith Tube. From an RGO photo published in 1958. Image courtesy of Phillip Gething

Mount Stromlo (Australia)

Zenith tube at Mount Stromlo in 1962. © National Archives Australia series A1200, control symbol L42631, Barcode 8832462.

NAOC Mizusawa - (Japan)



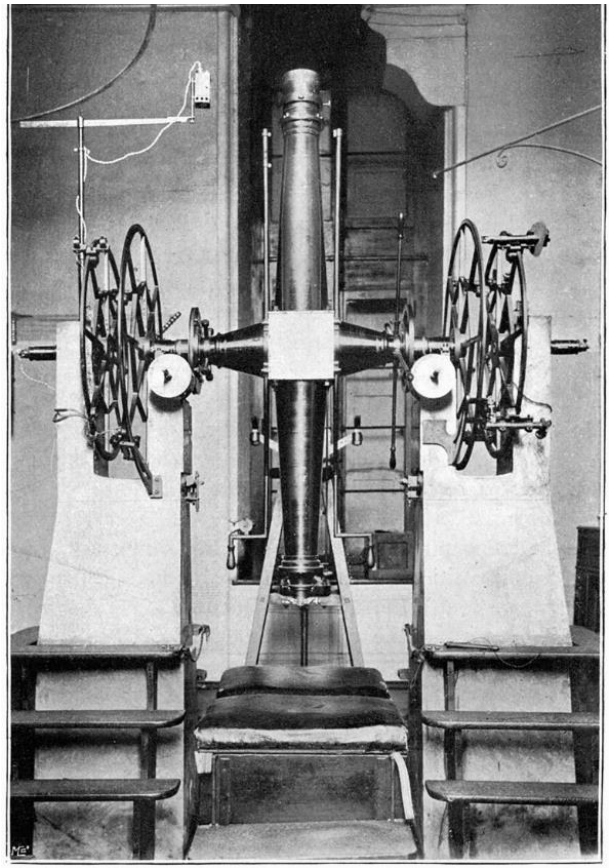
https://www.nao.ac.jp/study/mitaka-guide/en/audio.html?area=14&audio=48

Observatoire de Neuchâtel (1858-2007)

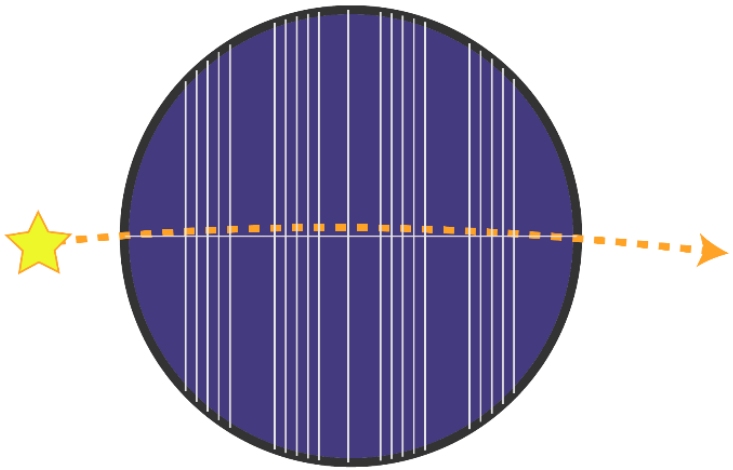
Almanach de la République et canton de Neuchâtel pour 1861, p. 36-37. PU 310.

TIME DETERMINATION BEFORE PZT (1858-1954)

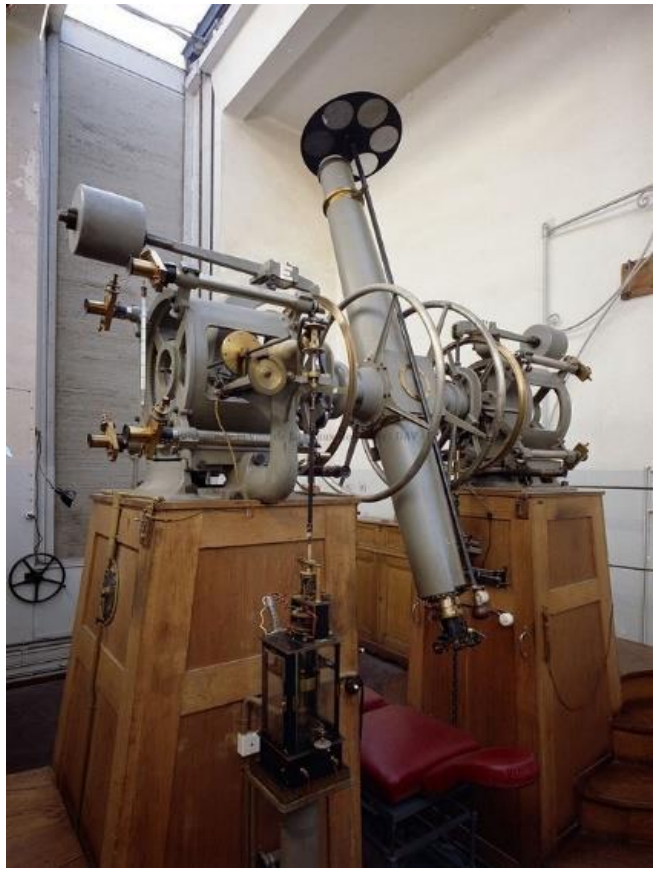
Ertel & Sohn, Meridian circle. 1858



DÉPARTEMENT DE L'INSTRUCTION PUBLIQUE. *L'Observatoire cantonal neuchâtelois, 1858-1912. Souvenir de son cinquantenaire et de l'inauguration du Pavillon Hirsch*. Valangin: HBN, 2012 [1912].



«SIP» Meridian circle. 1912



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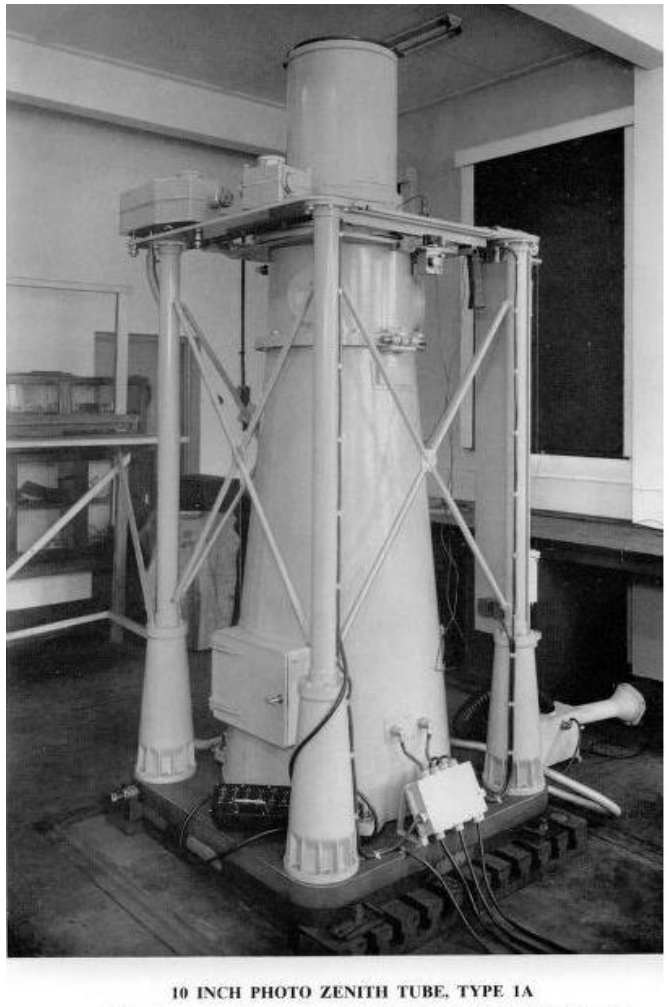
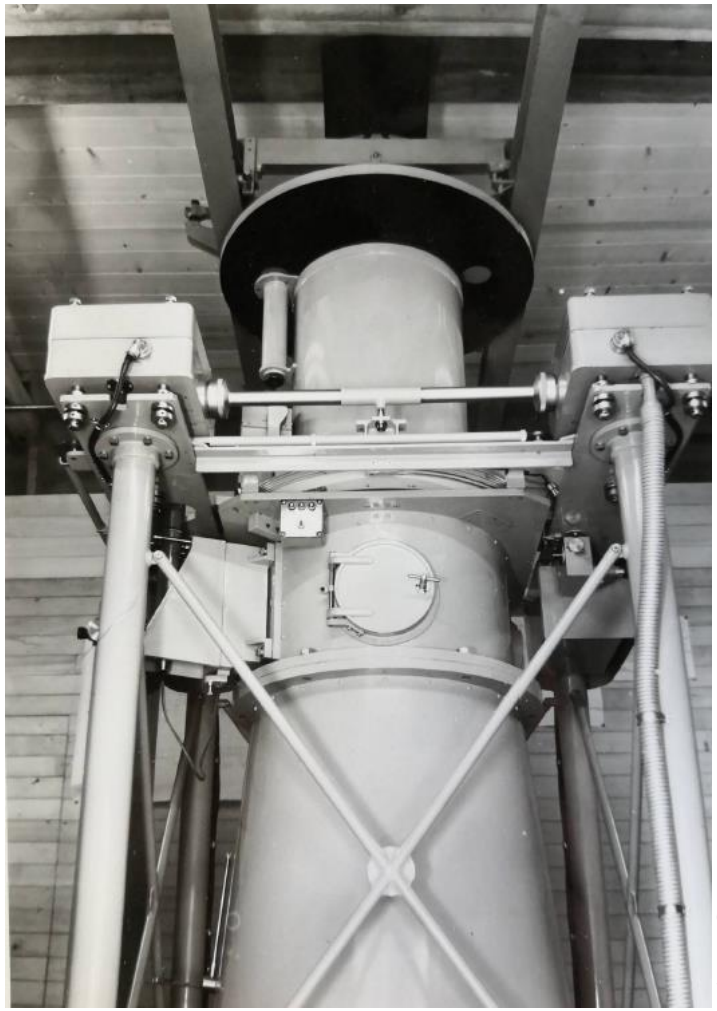
GRUBB & PARSONS' PHOTOGRAPHIC ZENITH TUBE - 1954



10 INCH PHOTO ZENITH TUBE, TYPE 1A

©Grubb&Parsons



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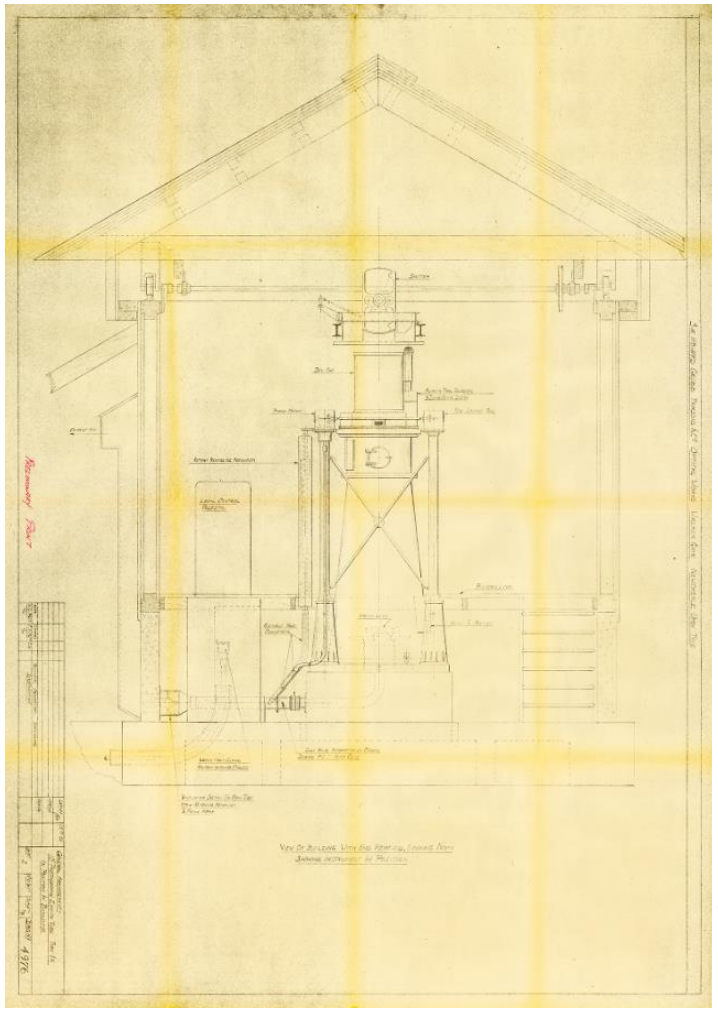

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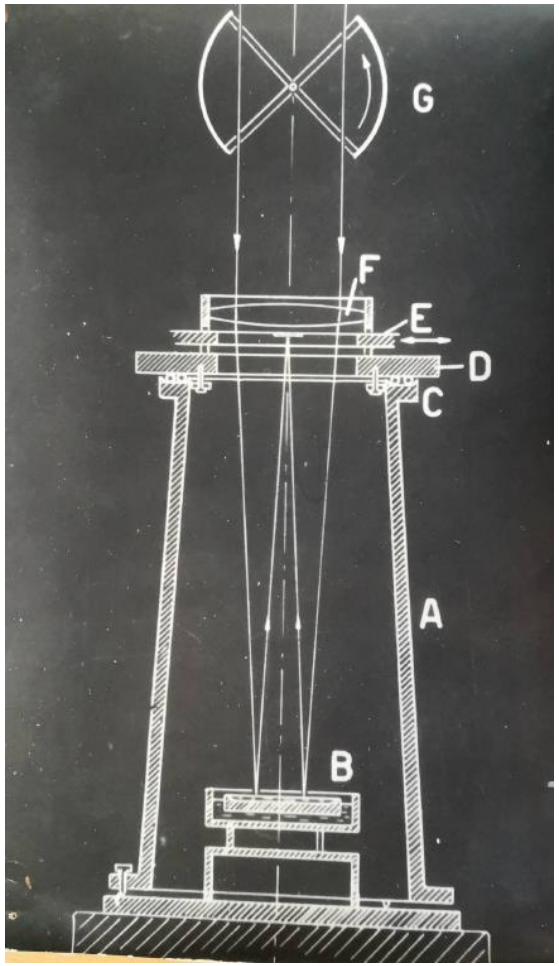
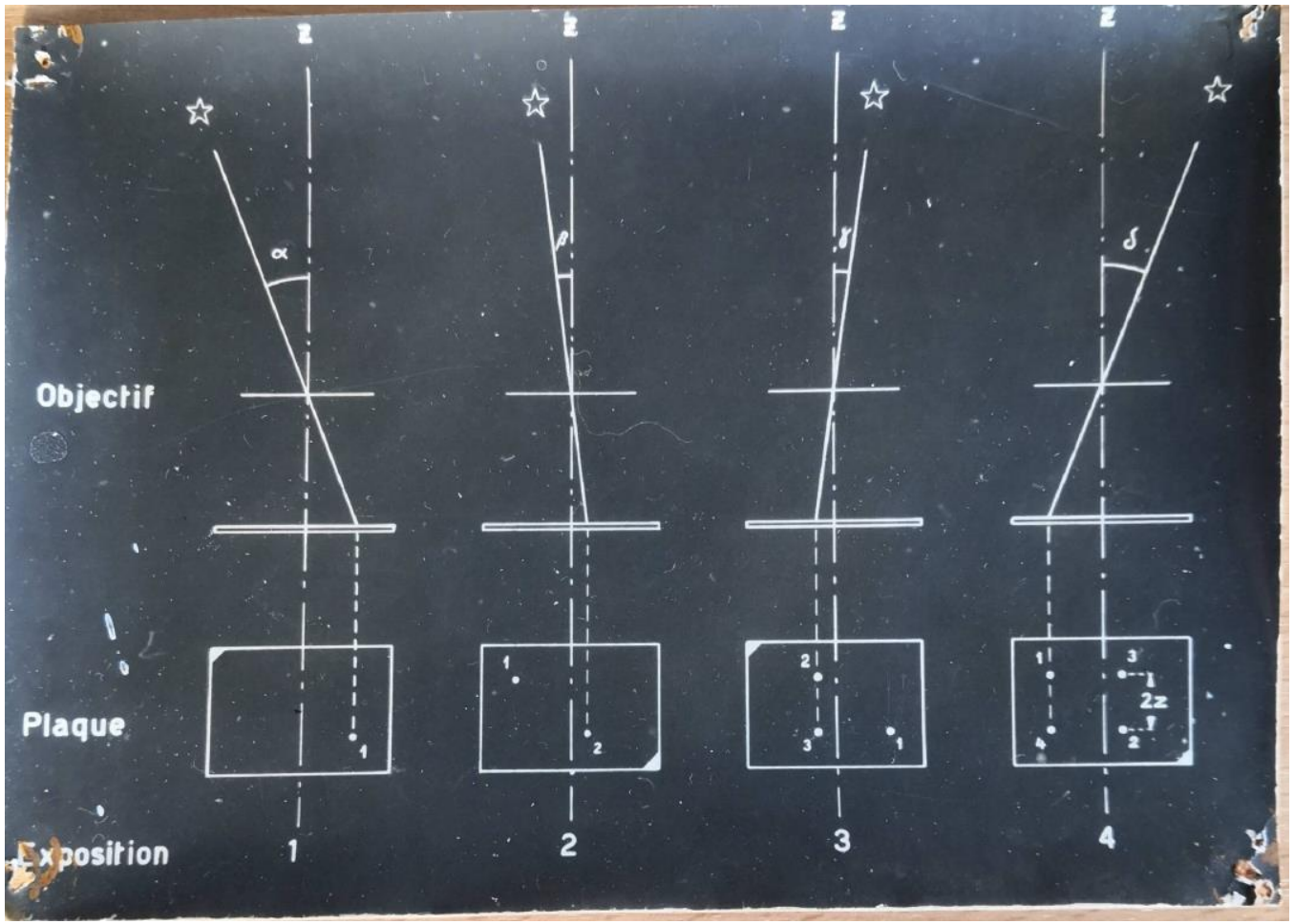
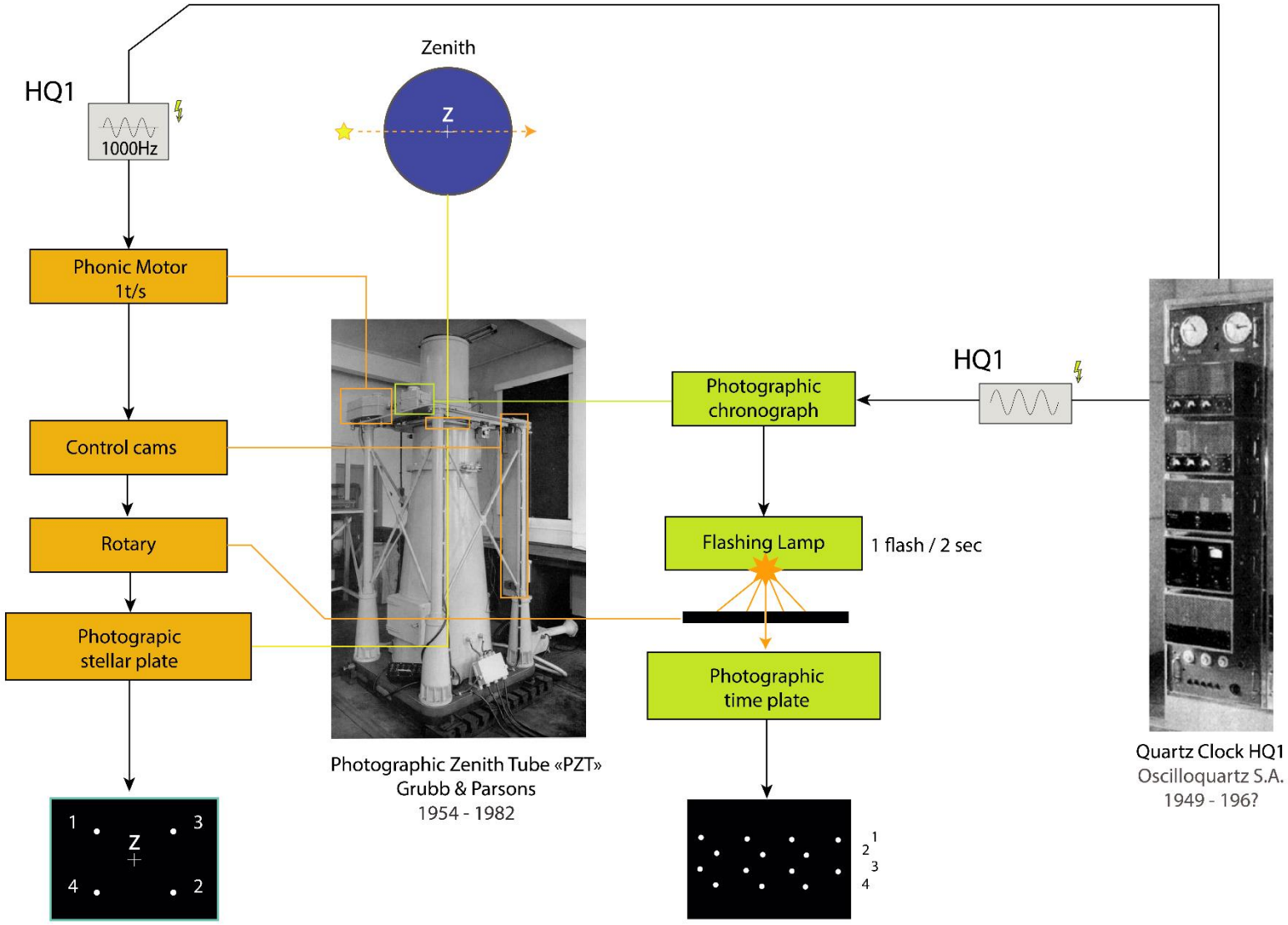
FUNDAMENTAL PRINCIPLES OF A PZT





OPERATING CHAIN OF PZT TIME DETERMINATION



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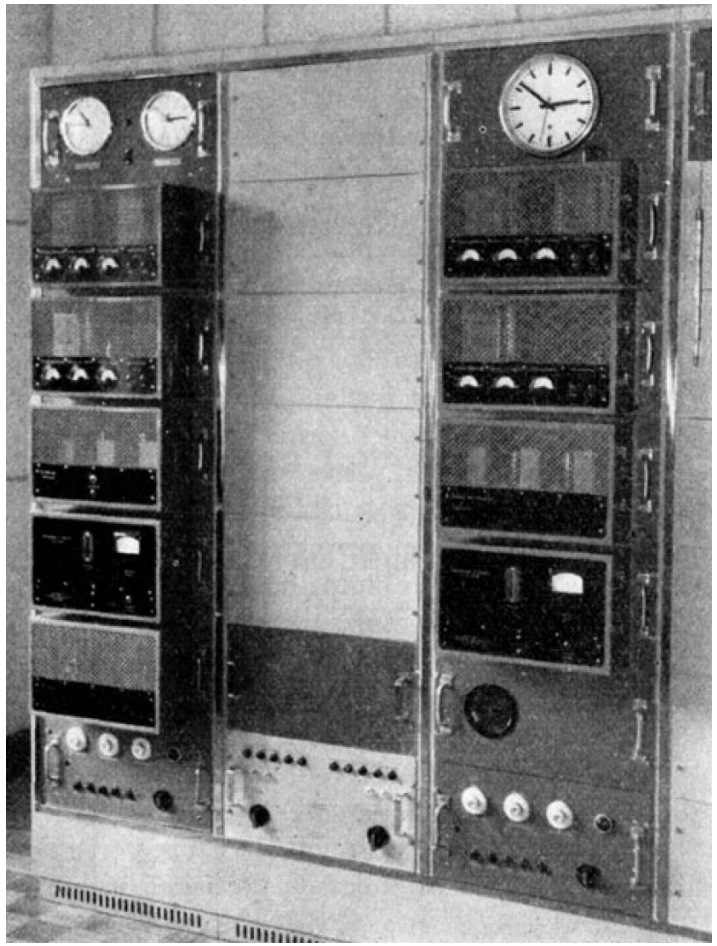
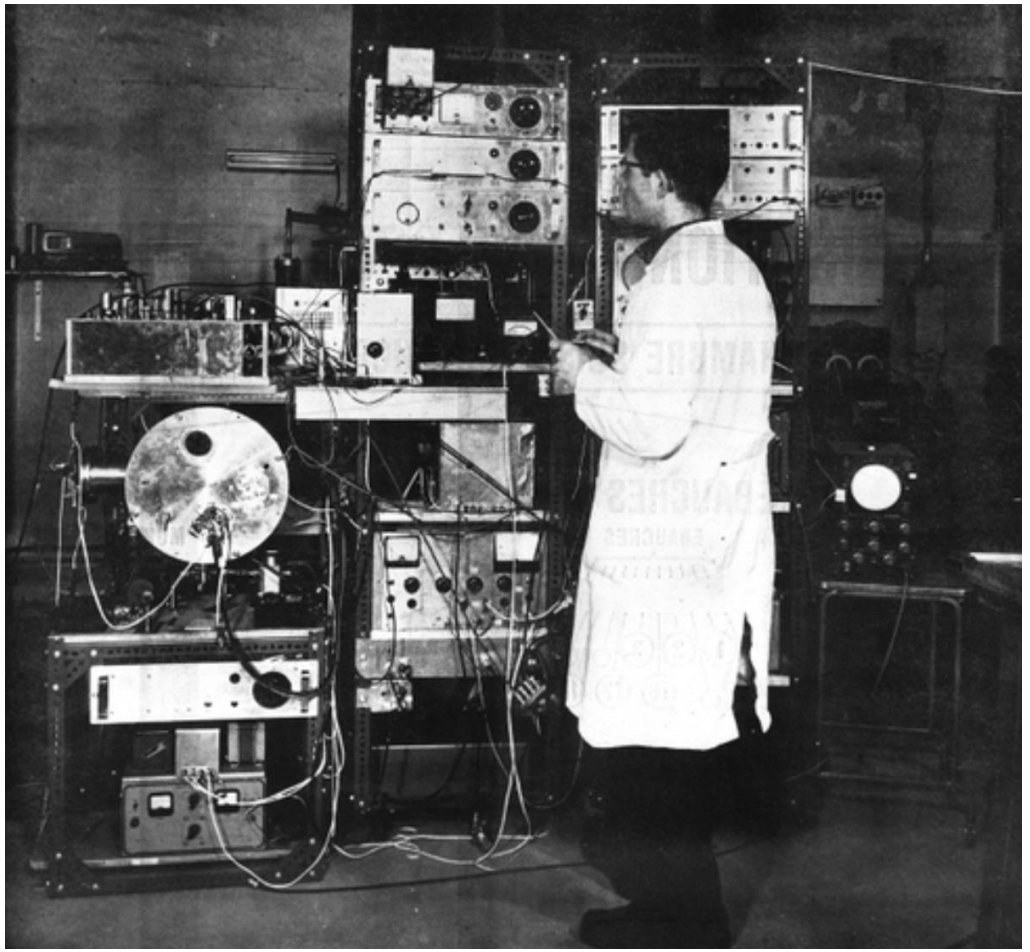
FROM EARTH TO CAESIUM: NEW STANDARD FOR THE SECOND IN 1967



Edmond Guyot, la conservation de l'heure avec les horloges à quartz, 1953.

Quartz clocks Q1 et Q2
1949



La Gazette technique, industrielle et scientifique, 12 décembre 1963.

Atomic clock
1963

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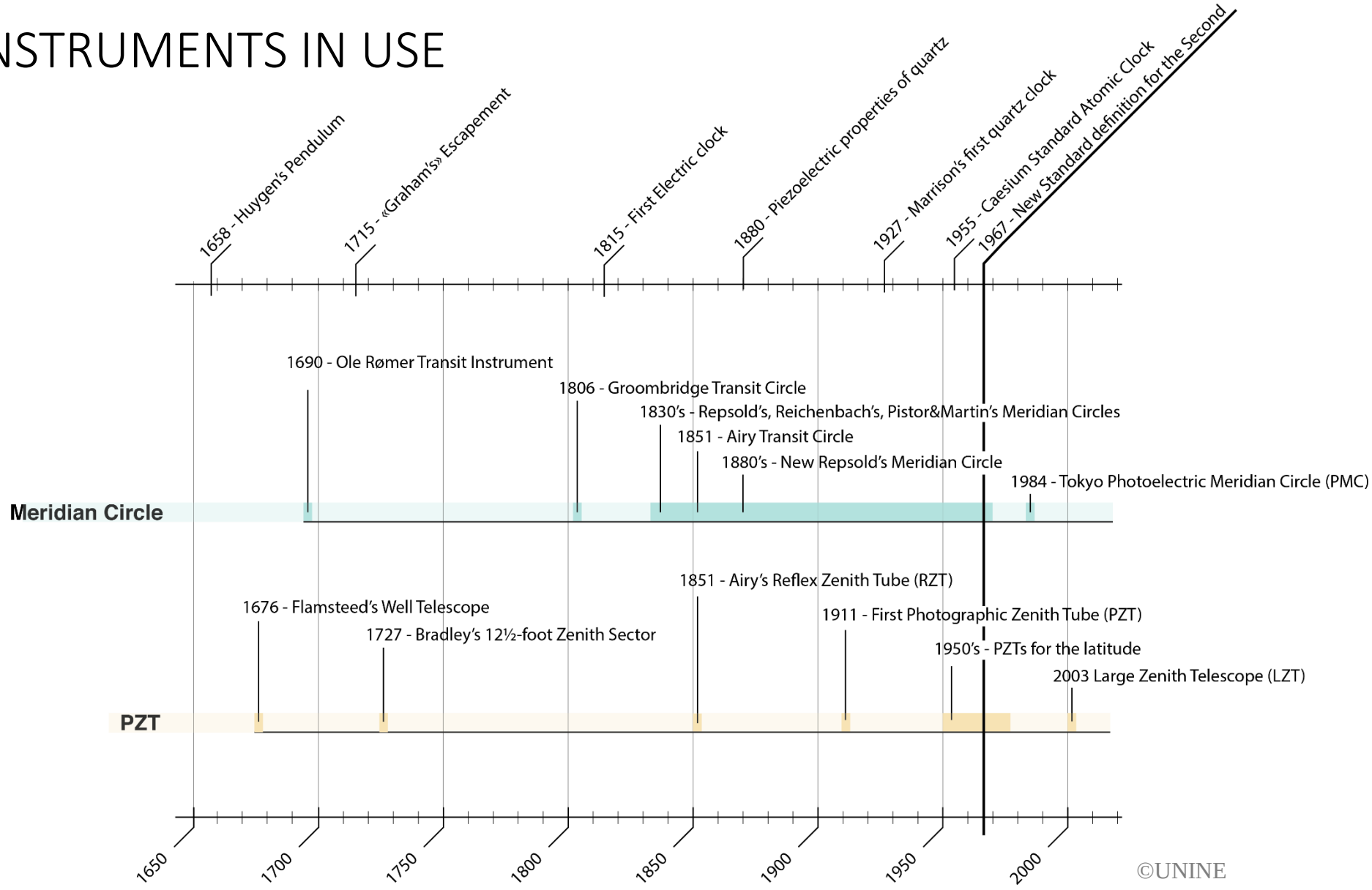
ASTRONOMICAL INSTRUMENTS IN USE



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