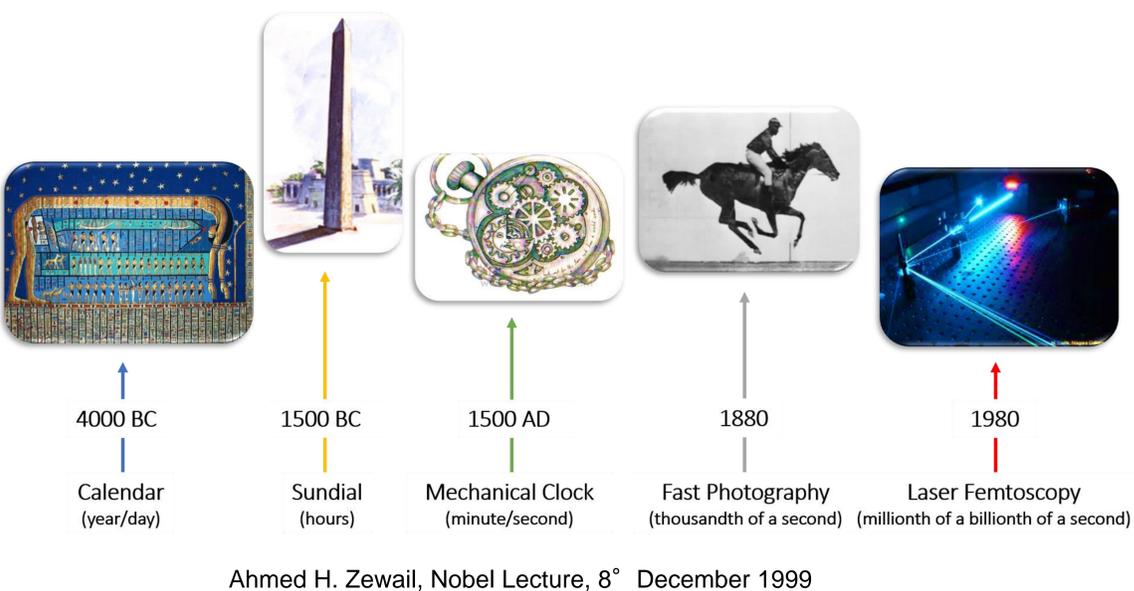


Festival della Scienza

Genova, 26 ottobre _ 5 novembre 2017

Contatti



Ahmed H. Zewail, Nobel Lecture, 8^o December 1999

Over many millennia humankind has thought to explore phenomena on an ever shorter time scale.

In this race against time, femtosecond and attosecond resolution (1 fs = 10⁻¹⁵ s, 1 as = 10⁻¹⁸ s) is the ultimate achievement for observing atoms and electrons at work!

In the 20th century we found out that time flow is relative, and depends on velocity and gravitational field experienced by the observer.

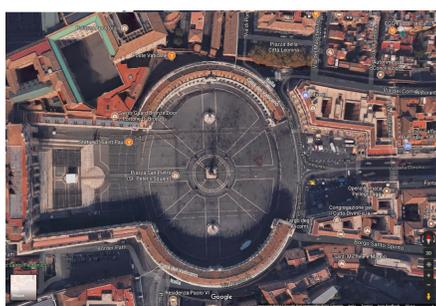
Salvador Dalí La persistencia de la memoria



From year to second



Palermo stone 3100 BC
Time probe = Nile inundation
Time resolution = year



Sundial clock 2000 BC
Time probe = Sun shadow
Time resolution = day/hour

SCIENTIFIC ERA



Mechanical Clock, 1600 AD
Time Probe = Pendulum oscillations
Time resolution = second

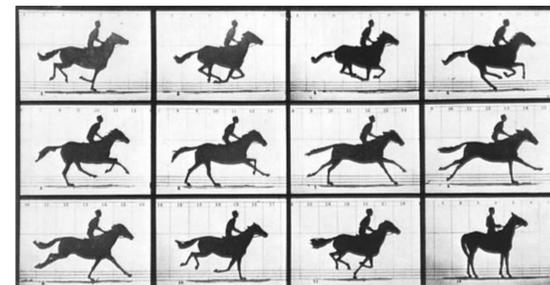
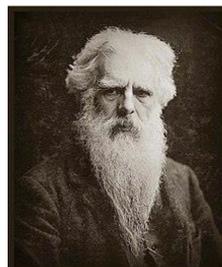
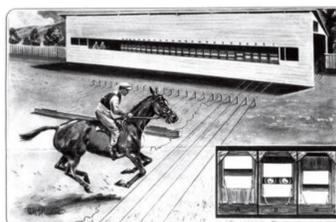
The race to sub-second: faster than human perception

Gericault, Derby d'Epsom



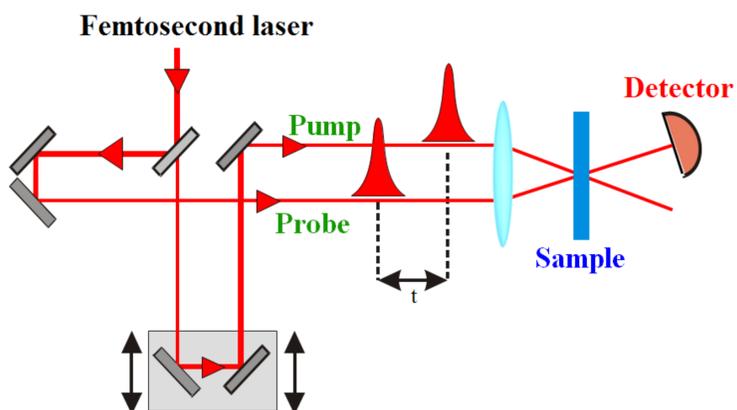
Human perception cannot resolve anything below ≈ 0.1 s. With this time resolution we cannot break down many dynamic events.

Question: are all four hooves of a trotting horse simultaneously out of contact with the ground at any point in its stride?



Eadweard Muybridge
Flash photography 1878
Time Probe = fast camera
Time resolution = 1 ms

The laser revolution: freezing atomic motion



Flashing a molecule with a femtosecond laser pulse can be compared to the opening of a camera shutter.

The **pump pulse** = flash light

The **probe pulse** = camera

temporal delay = time evolution



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