

Übersicht über Kapitel 4

4. Atome im magnetischen und elektrischen Feld

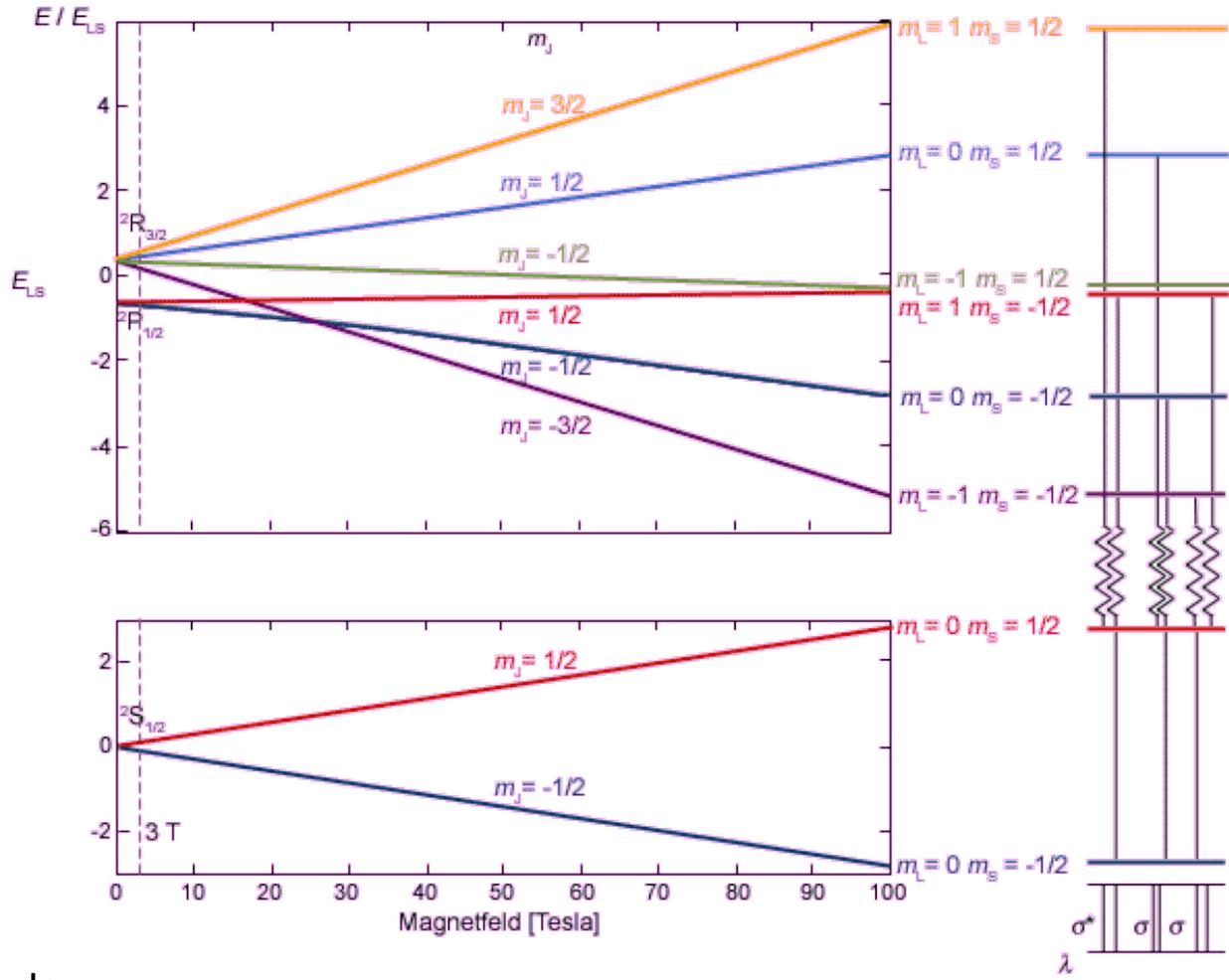
4.1 Der Zeeman Effekt

4.2 Der Paschen Back Effekt

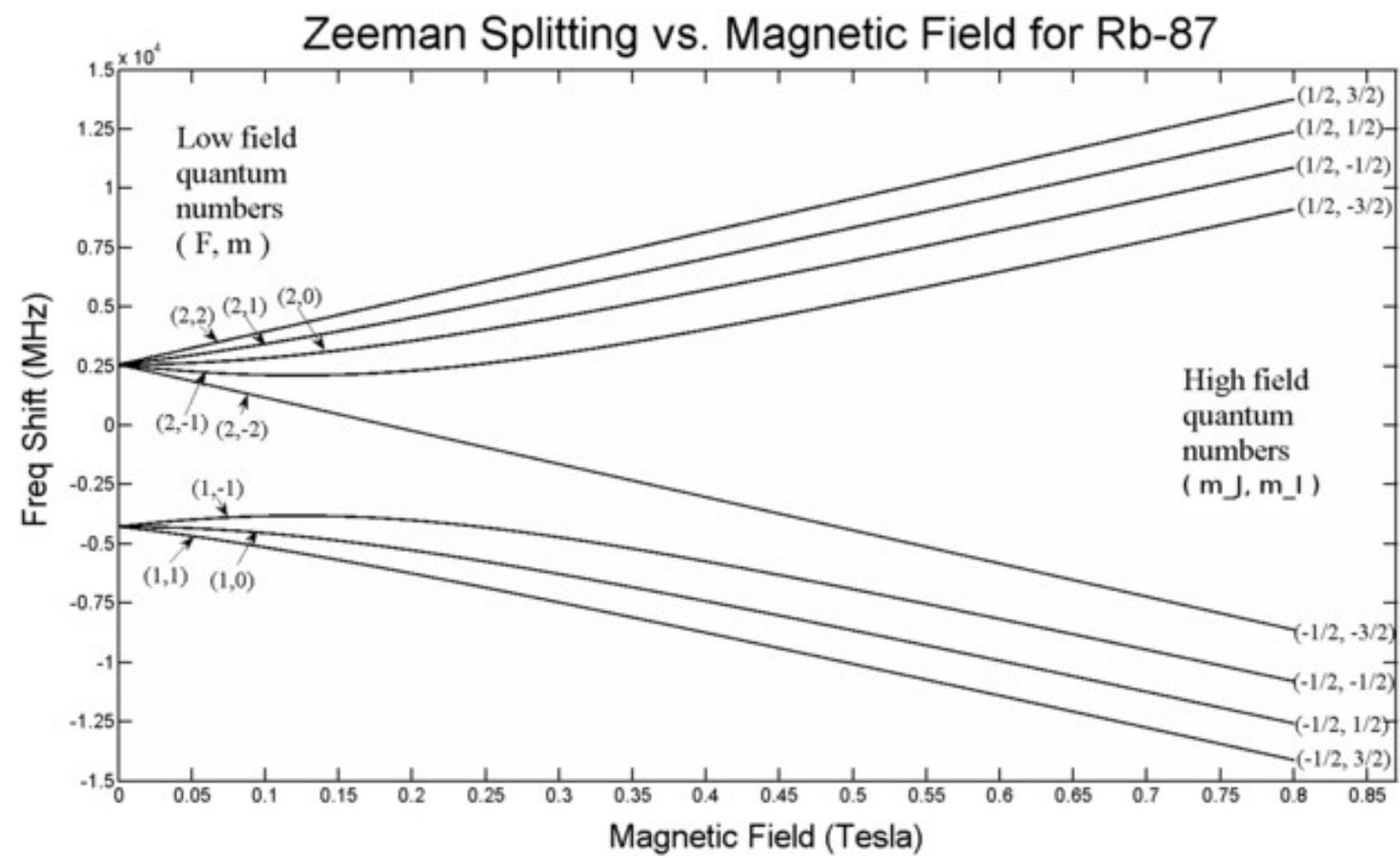
4.3 Elektrische und magnetische Dipolübergänge

4.4 Der Stark Effekt

Zeeman bis Paschen Back Effekt in Wasserstoff

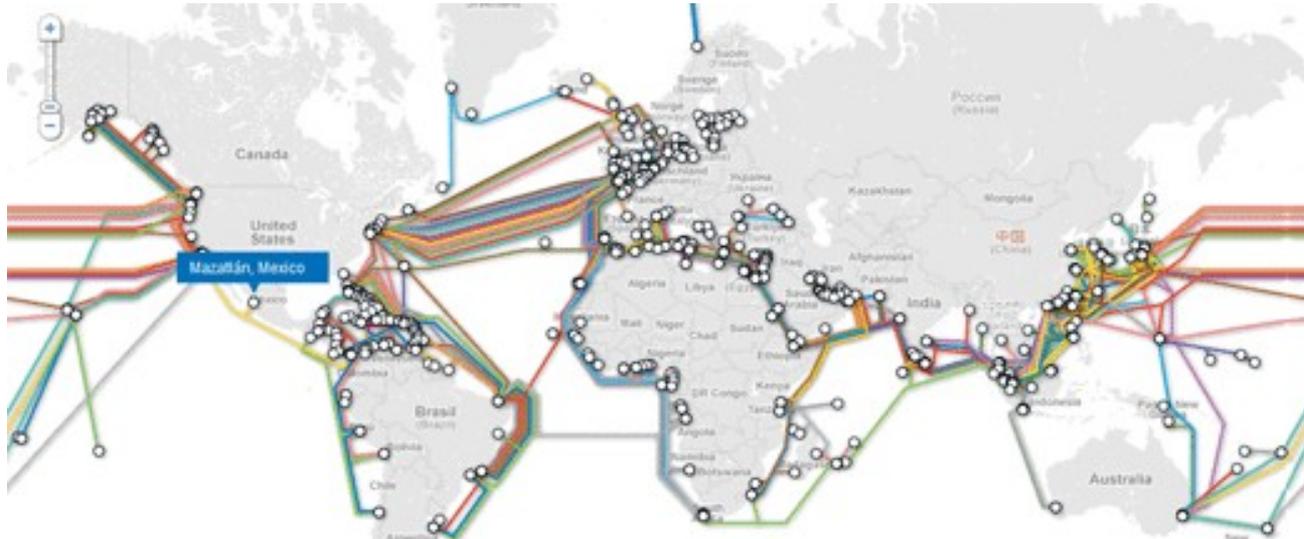


Zeeman Effekt in Rubidium (5s)



wikipedia

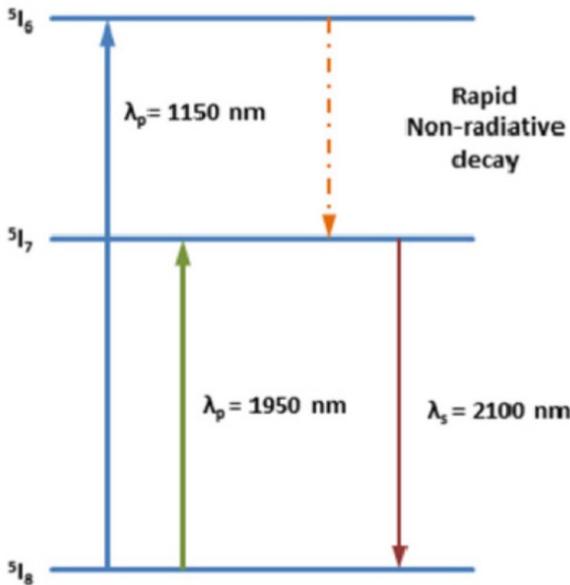
Das weltweite Glasfasernetz



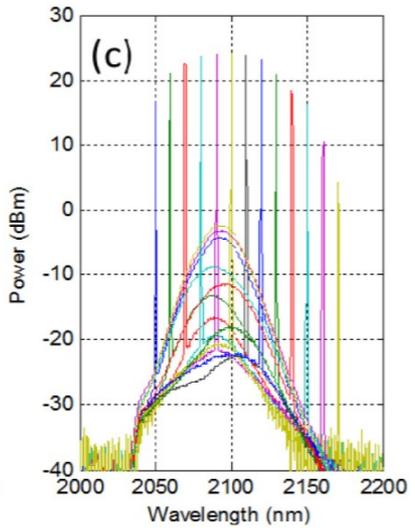
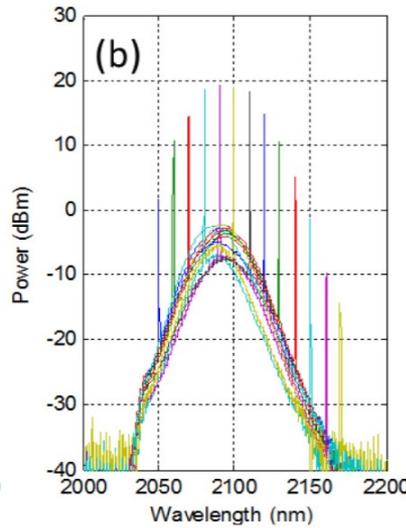
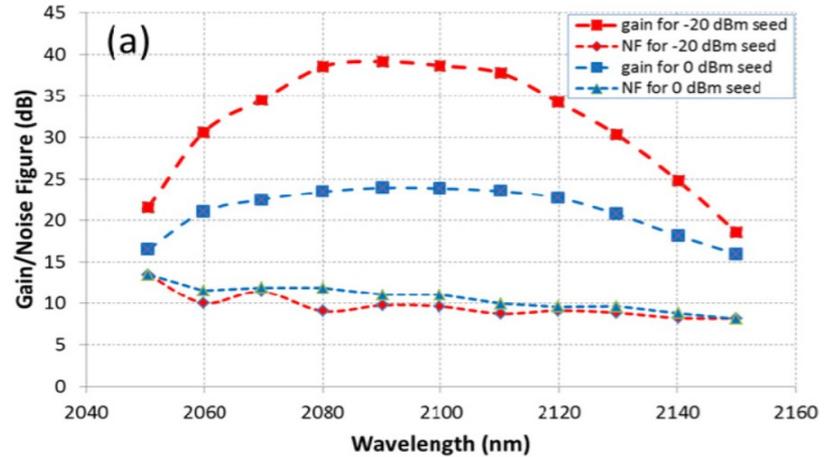
Pro Kabel wenige Glasfasern (2-4) mit bis zu 1TBit/s
Signal wird gemultiplext über mehrere Wellenlängen im IR Bereich
Signalverstärkung alle 50-80 km wegen sehr geringer Absorption

Signalverstärkung in Glasfasern

Ho oder Er Dotierung der Glasfaser



Direkte Signalverstärkung über Stimulierte Emission
 Optics Express 24, 261862 (2016)



Neuer Rekord

nature photonics

Article

<https://doi.org/10.1038/s41566-022-01082-z>

Petabit-per-second data transmission using a chip-scale microcomb ring resonator source

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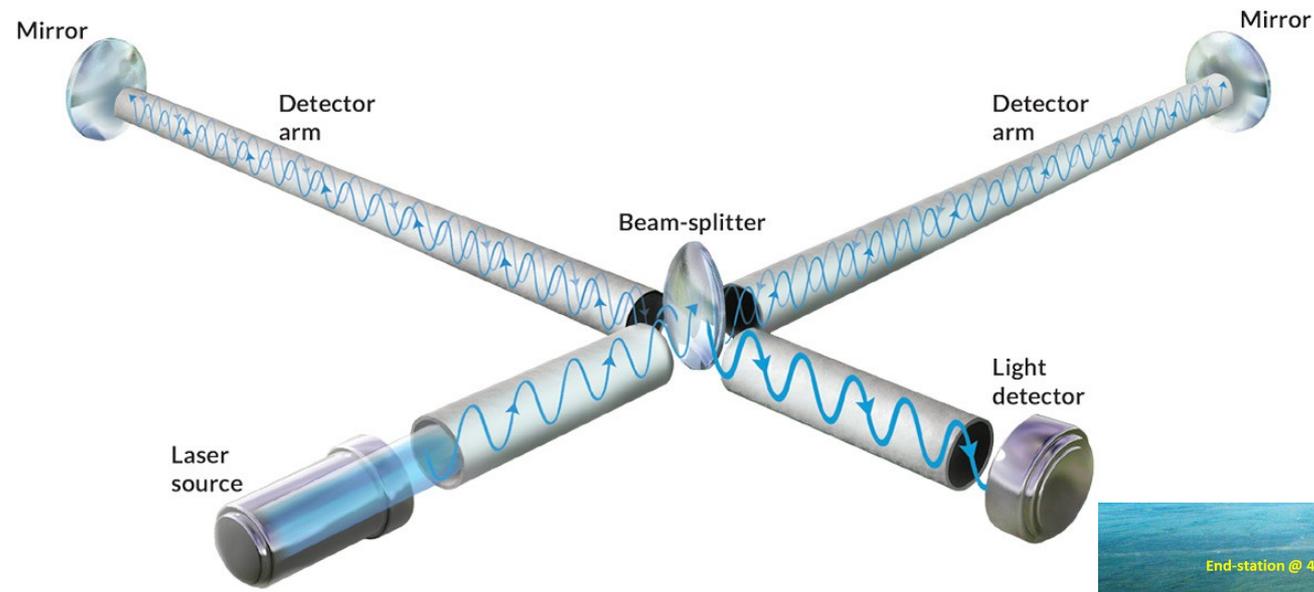
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 Check for updates

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and L. K. Oxenløwe ^{2,5}

Optical fibre communication is the backbone of the internet. As essential core technologies are approaching their limits of size, speed and energy-efficiency, there is a need for new technologies that offer further scaling of data transmission capacity. Here we show that a single optical frequency-comb source based on a silicon nitride ring resonator supports data capacities in the petabit-per-second regime. We experimentally demonstrate transmission of 1.84 Pbit s^{-1} over a 37-core, 7.9-km-long fibre using 223 wavelength channels derived from a single microcomb ring resonator producing a stabilized dark-pulse Kerr frequency comb. We also present a theoretical analysis that indicates that a single, chip-scale light source should be able to support 100 Pbit s^{-1} in massively parallel space-and-wavelength multiplexed data transmission systems. Our findings could mark a shift in the design of future communication systems, targeting device-efficient transmitters and receivers.

Das LIGO Experiment



Das LIGO Experiment

Selected for a *Viewpoint in Physics*
PHYSICAL REVIEW LETTERS

PRL 116, 061102 (2016)

week ending
12 FEBRUARY 2016

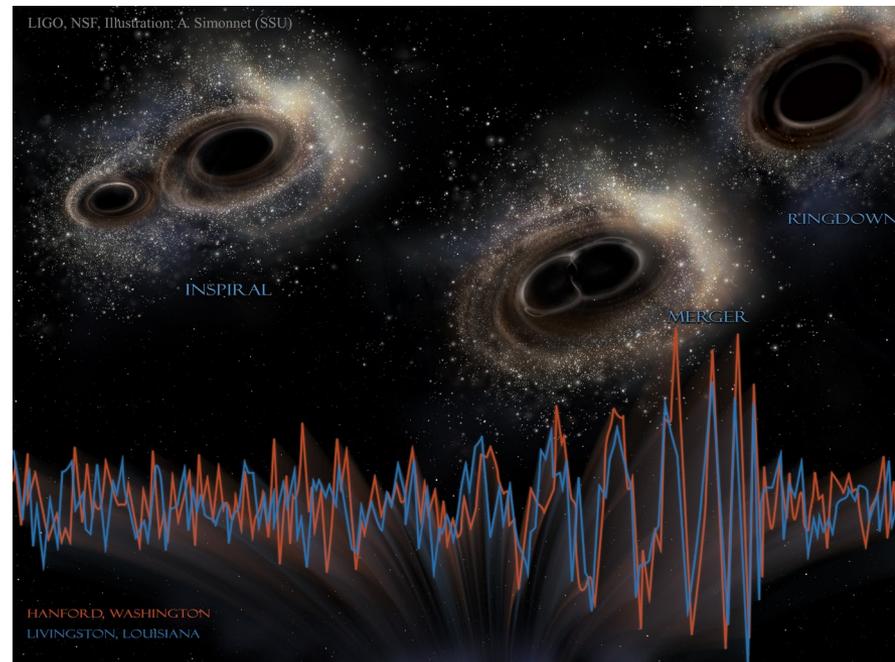


Observation of Gravitational Waves from a Binary Black Hole Merger

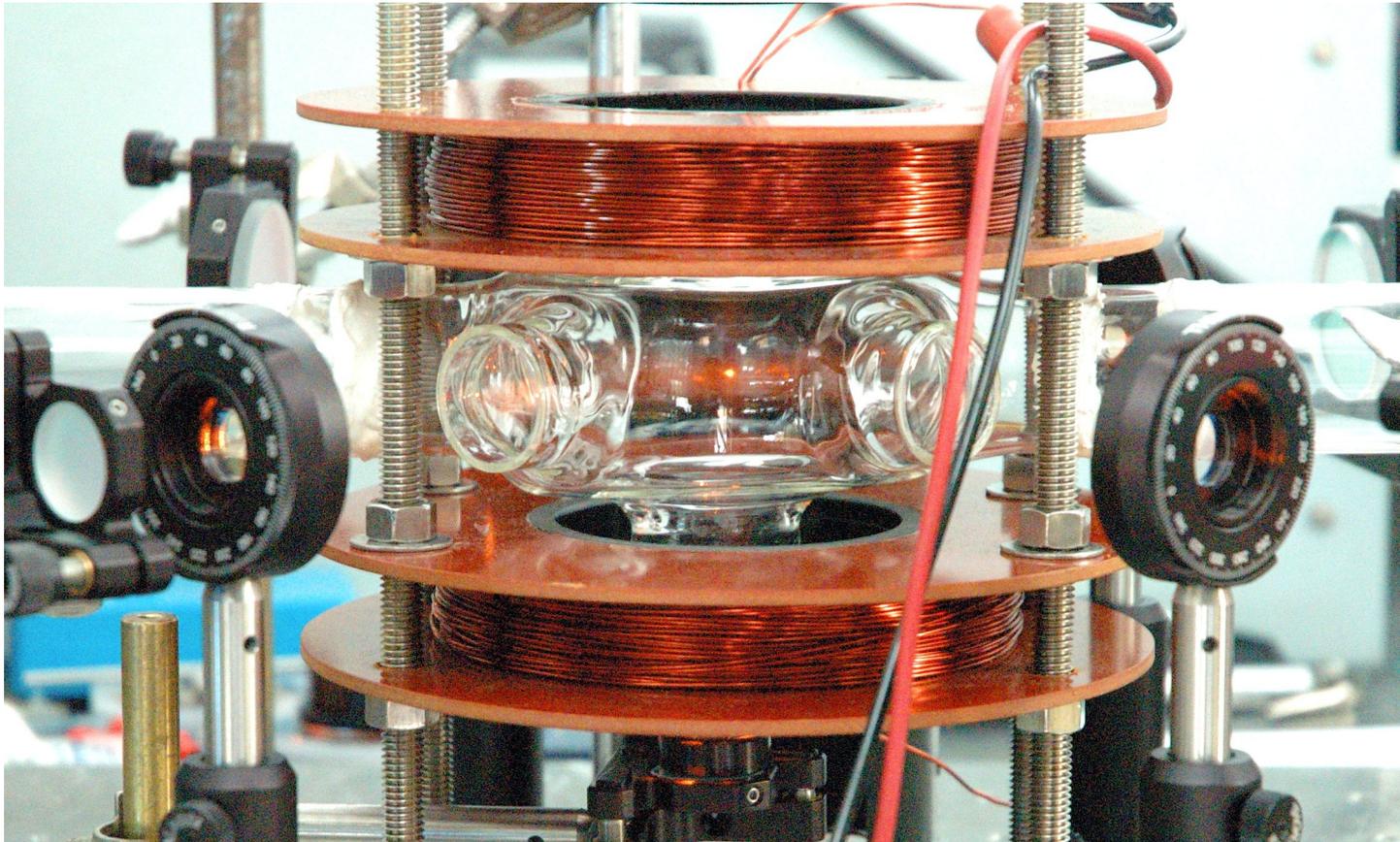
B. P. Abbott *et al.**

(LIGO Scientific Collaboration and Virgo Collaboration)

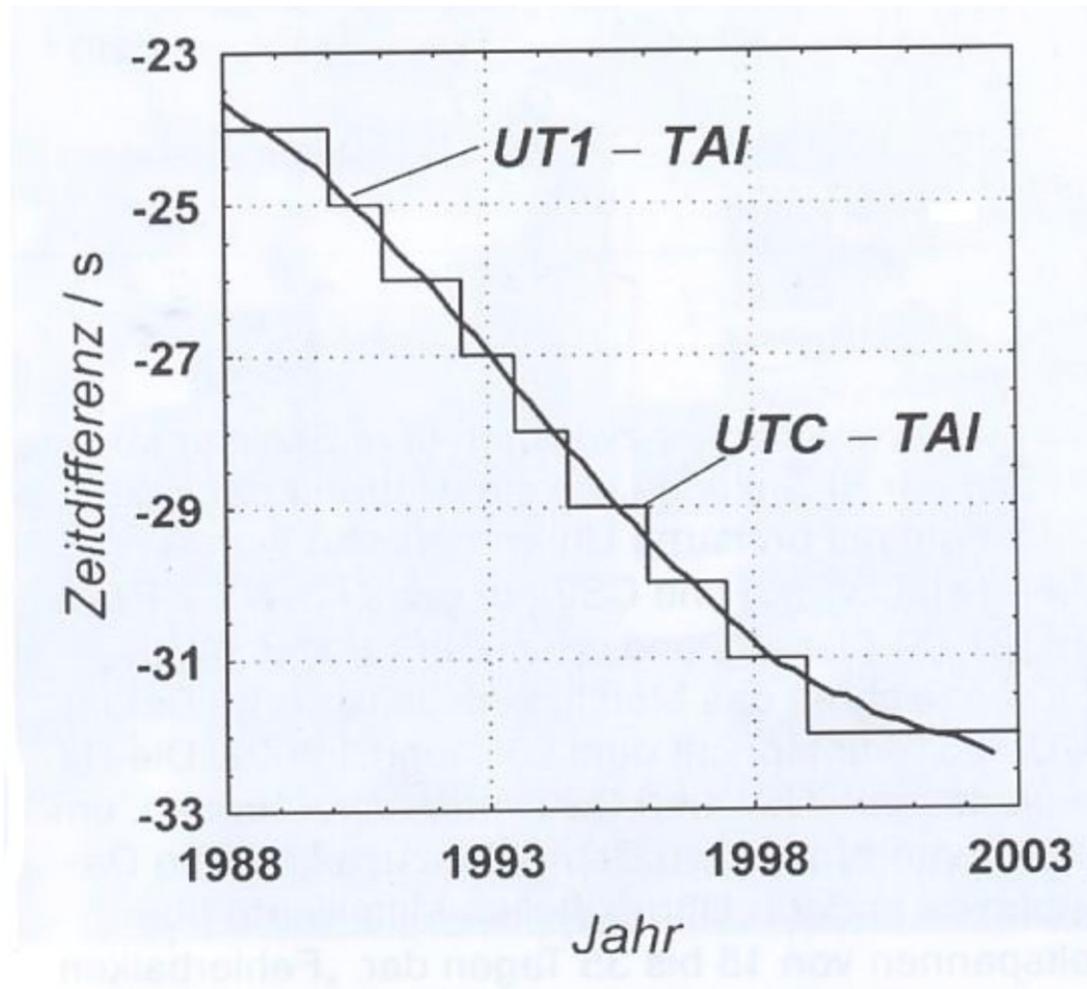
(Received 21 January 2016; published 11 February 2016)



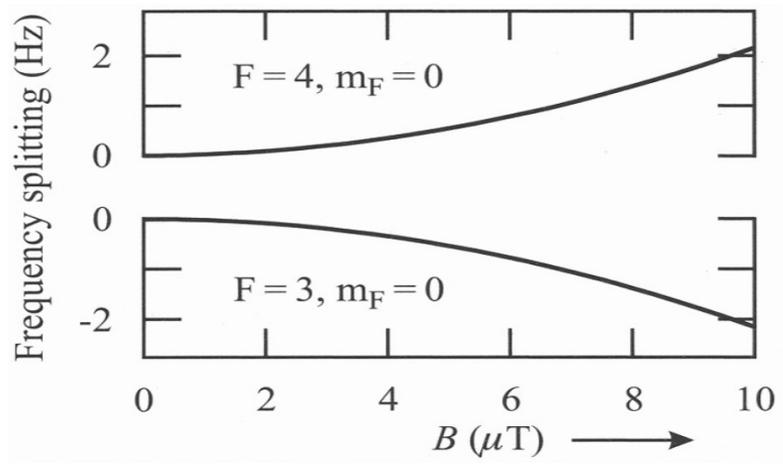
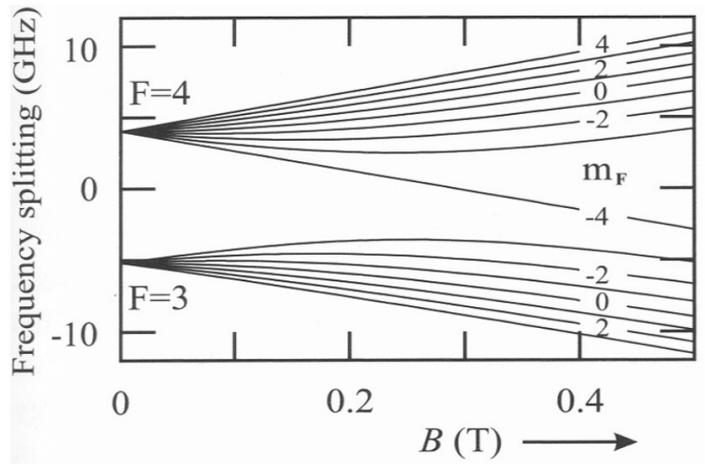
Magneto-optische Falle



UC1, UTC und Schaltsekunden



Hyperfeinstruktur von ^{133}Cs

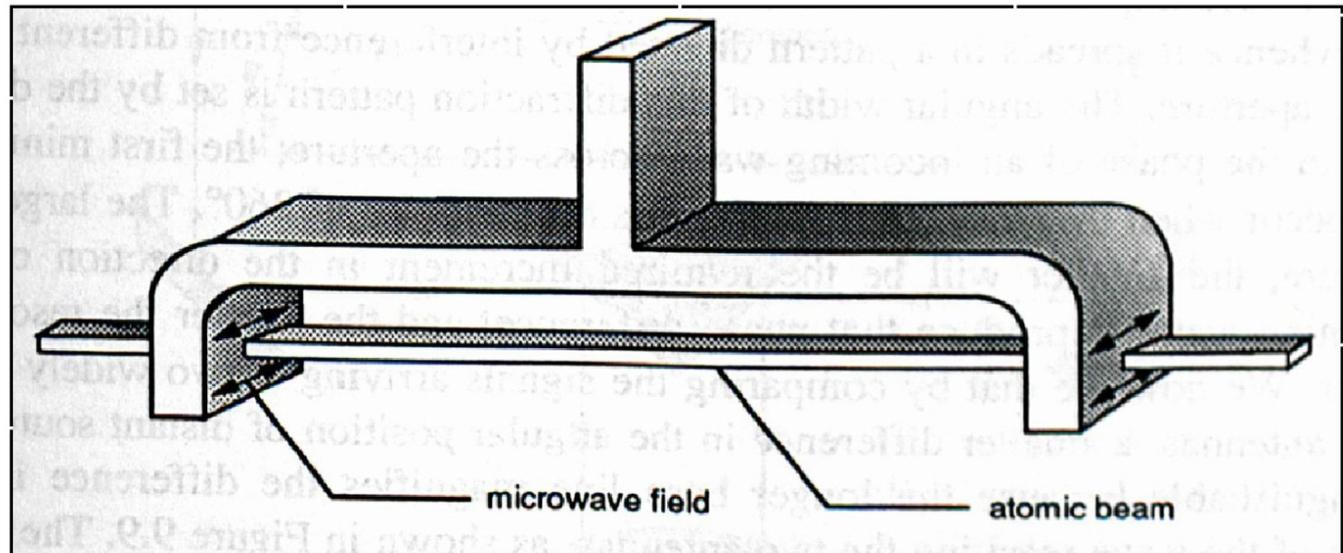




Norman Ramsey¹
(1915-2011)
Nobelpreis 1989

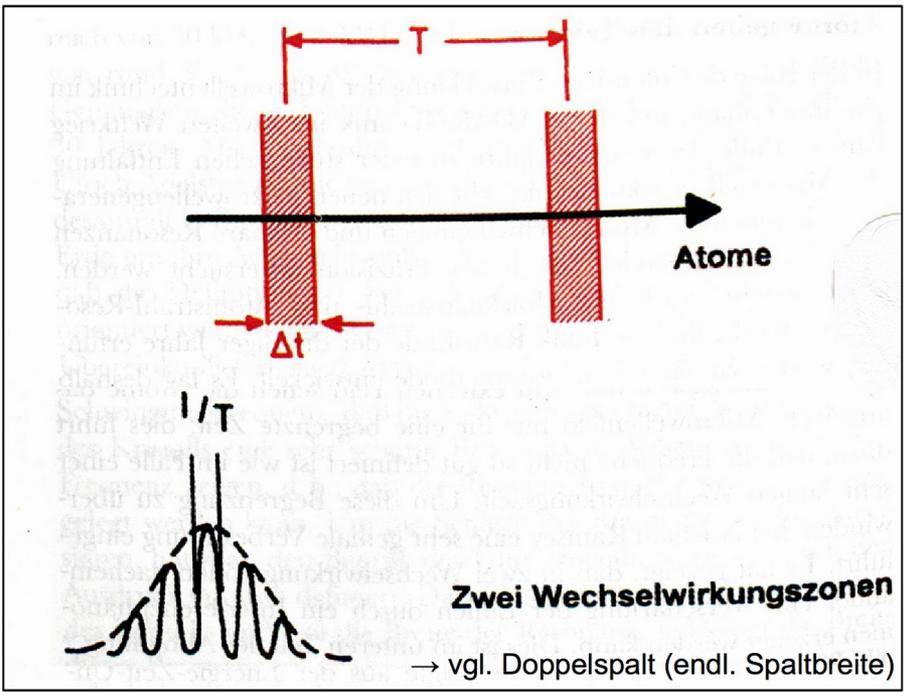
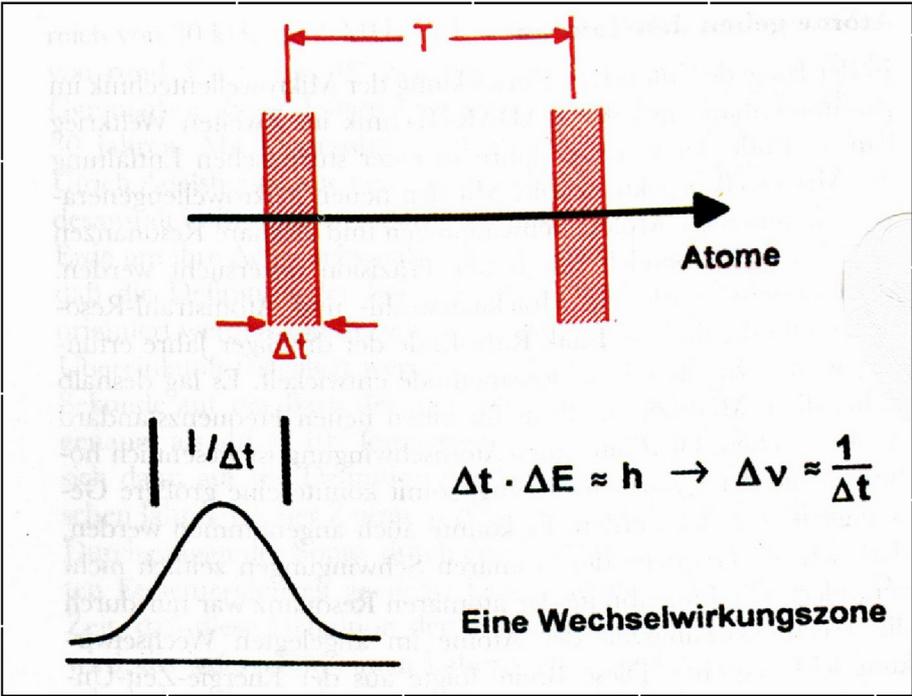
Das Ramsey-Prinzip

→ experimenteller Aufbau zur Erhöhung der Wechselwirkungszeit:

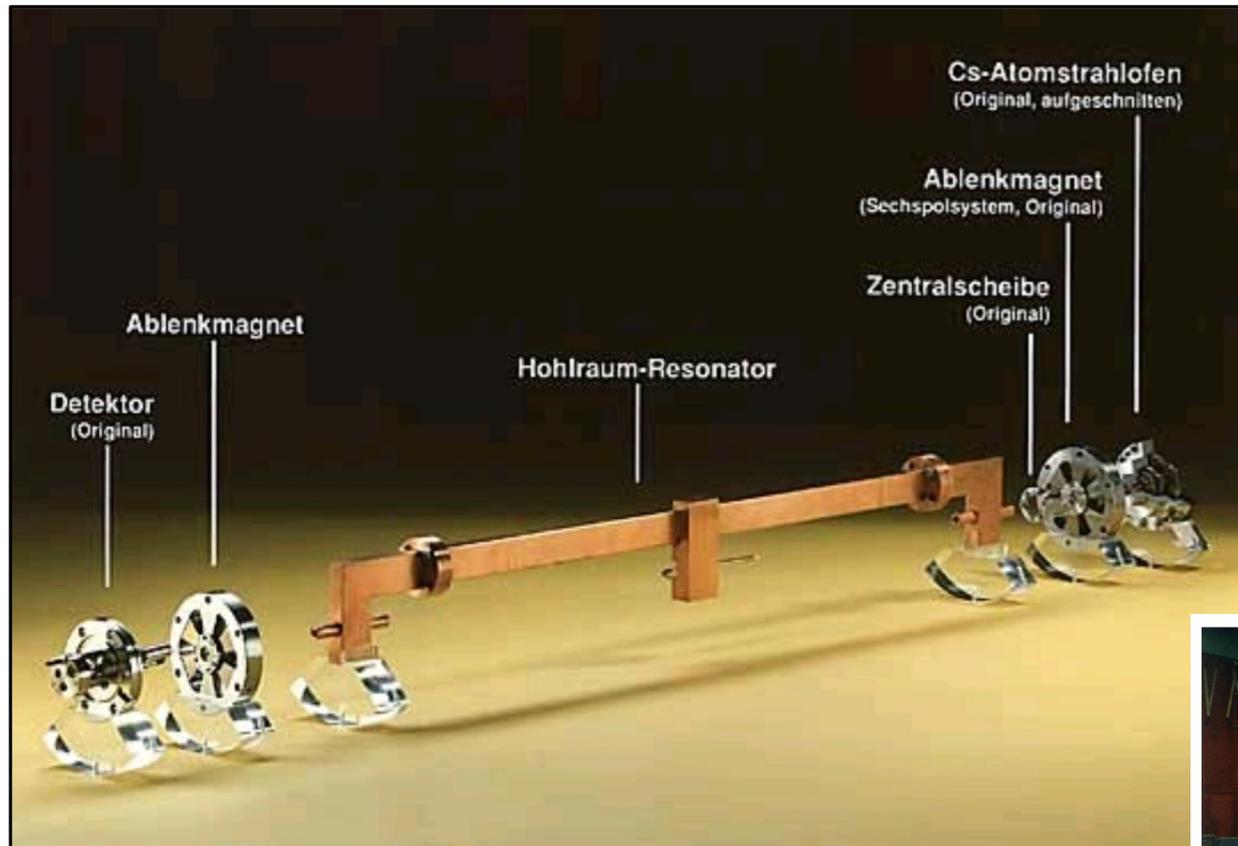


„The Ramsey separated field atomic resonance cavity“²

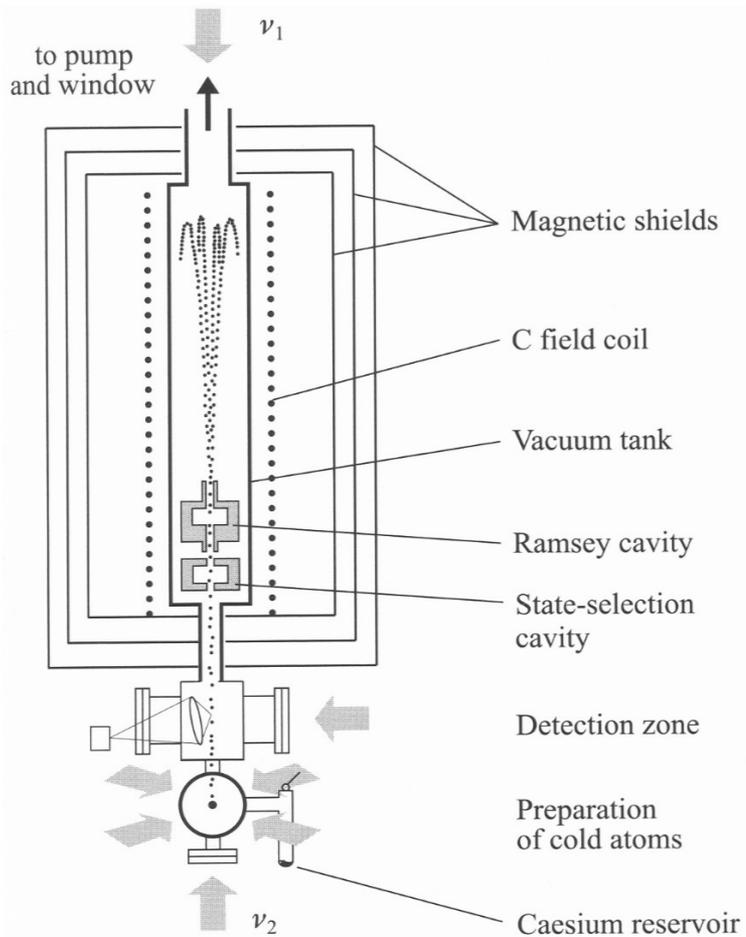
Das Ramsey Prinzip



Das Cs-Strahlrohr

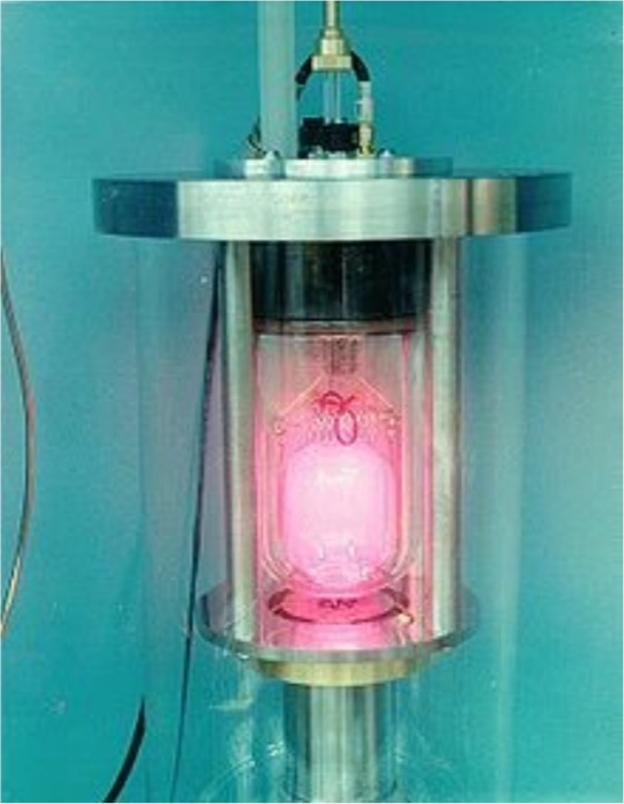
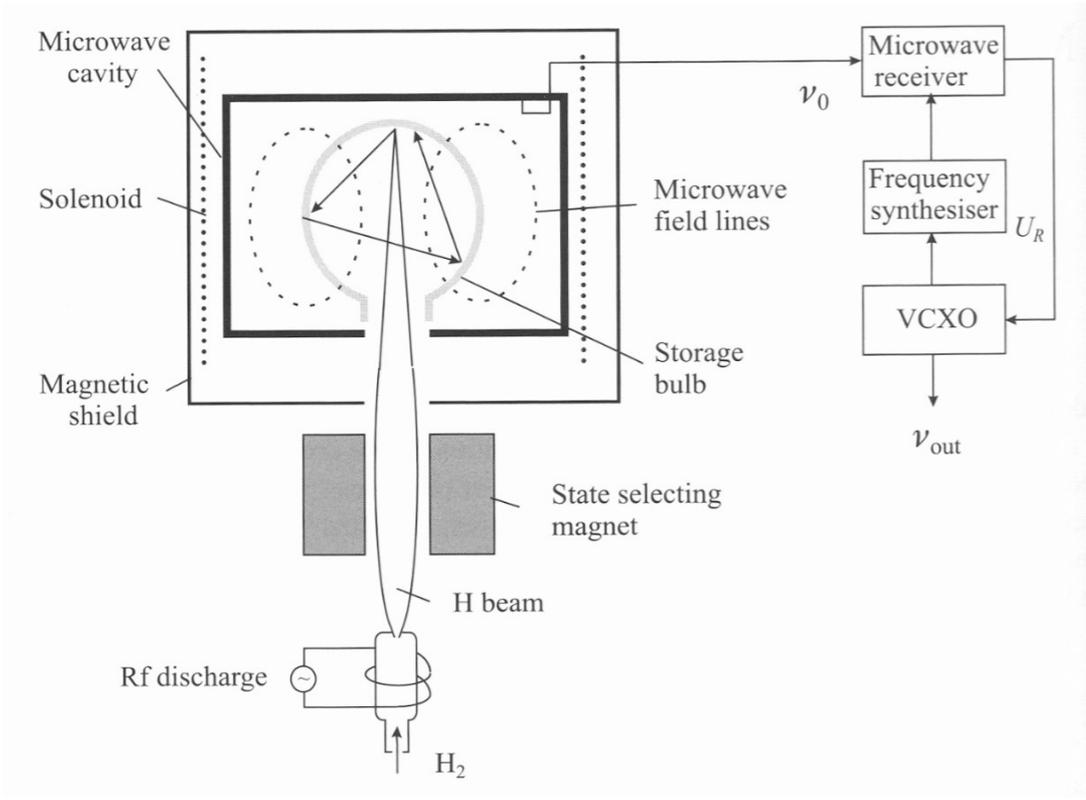


Die Cs-Fontaine



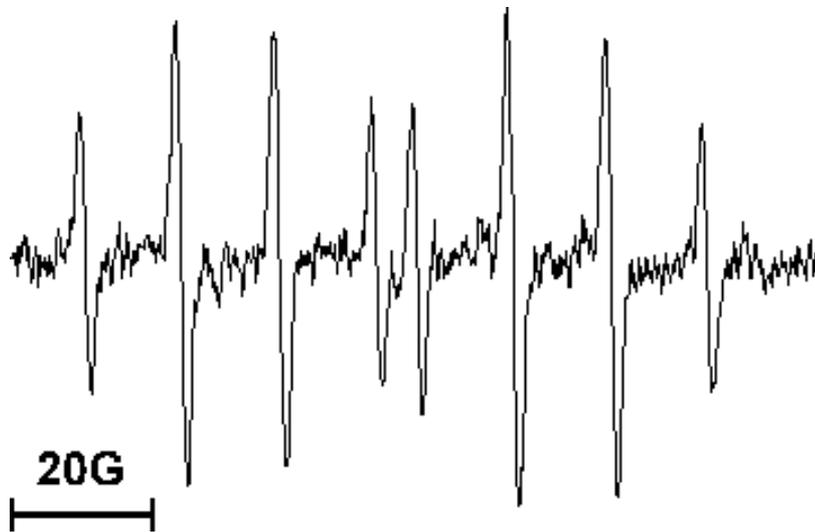
CSF1 und 2 bei der PTB

Der Wasserstoff-Maser



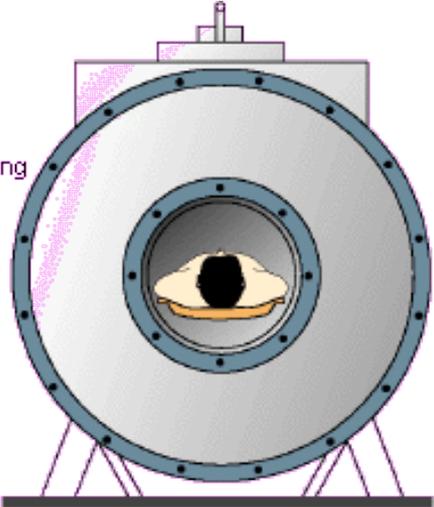
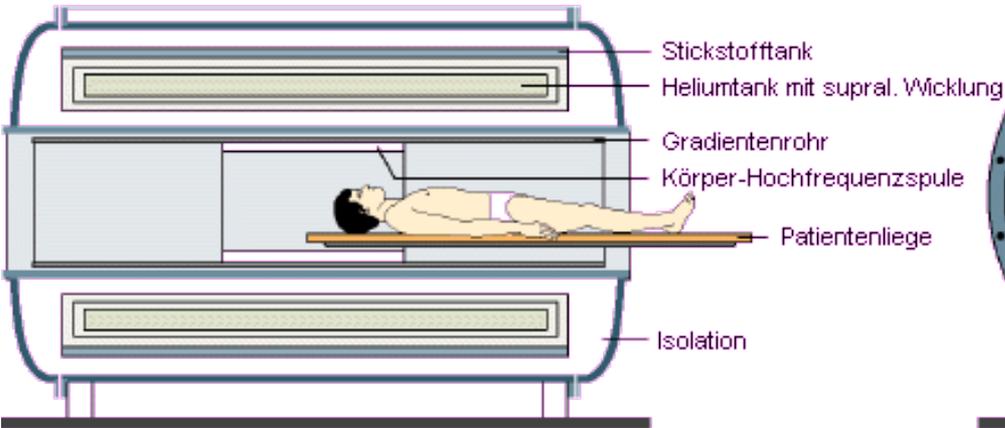
Elektronenspinresonanz

Identifikation von chemischen Substanzen
und Aufklärung von Reaktionsmechanismen



5-(Diethoxyphosphoryl)-5-methyl-1-pyrrolin-N-oxid

Kernspinresonanz



b

