

Miniaturized Microwave Resonator for Atomic Clocks

Opportunity on offer

- R&D collaboration
- Licensing

Patent status:

Priority application: EP12155696, 16th February 2011
PCT filing: 12th February 2012

Applicant: University of Neuchâtel (UniNE)

Description of the Invention

Background

Atomic clocks are the most stable frequency standards available and find their application in multiple mobile and battery-powered applications, such as communication and navigation systems. There has been a long standing need to develop reliable and low-power atomic clocks to support these applications. The key to achieve this goal lies in the miniaturization of the microwave resonator of the atomic clock to well below the wavelength of atomic transition (in case of ⁸⁷Rb: 6.35 GHz, i.e. 4.4 cm).

Technology

A stackable micro loop-gap resonator (μ -LGR) device which can be easily adapted to different atomic frequencies (e.g. those of Cs or Rb) has been developed as a result of a collaboration between UniNE and EPFL.

Development status

- Development of prototype μ -LGR device
- Measurements of prototype are in good agreement with simulations and meet application requirements
- Demonstrated suitability for Rb atomic clock applications

Main advantages / innovative features

- Suitable for production by industrial microwave PCB processes (at large scale and low cost)
- Excellent tolerances and reproducibility
- No use of adhesives
- Improved precision
- Suitable for use of cold atoms or molecules/ions produced by laser cooling

Potential applications

- ✓ Telecommunication
- ✓ Navigation systems
- ✓ Mobile networks and Smart Grids
- ✓ Atomic sensors

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