RLS

Repetition laser station (RLS)

Metrological system for long-distance coherent optical frequency transfer

Exail Quantum Systems presents its repeater laser station for long-distance dissemination of an ultra-stable optical frequency through standard telecom fiber links.
It enables distribution to a distant user and/or cascaded links for dissemination over many 1oo km.
The racks designed allow easy installation in standard telecom network nodes.

General architecture

The RLS is a stand-alone system with its own power supply unit (PS) that actively compensates the phase noise introduced by the fiber links and provides an ultra-stable output optical frequency [1].
The station can compensate for the fiber noise of one main branch and of an auxiliary local branch to bring the signal to final user.
To this purpose, the RLS includes a local optical oscillator (laser diode), a 2-output ultra-low-noise interferometer and the electronics for noise compensation of 2 links.

Features

- 2 phase-coherent optical outputs for signal dissemination
- Noise correction electronics for 2 links with fully automated phase-lock loops
- Low-phase-noise laser system
- Automatic polarization control
- Compliant with DWDM Telecom network infrastructures
- Intelligent and autonomous system with remote control of all physical parameters

[1] *F. Guillou-Camargo et al. (2018).*
First industrial-grade coherent fiber link for optical frequency standard dissemination.
Applied Optics.

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OPTICAL CHARACTERISTICS

Operating Wavelength	Channel 44 of the ITU grid: 1542.14 nm or Channel 07 of the ITU grid: 1572.03 nm [1]
Output powers	< 2 mW
Laser class	3R
Laser linewidth	< 5 kHz
Regime	CW
Input power range	between 1 nW and 100 µW
Frequency tunability	50 pm

[1] Other wavelengths available on request (e.g. in L-band)

PHYSICAL CHARACTERISTICS

Dimensions	19'' rack, 545 mm depth max , 7U (RLS: 5U, PS: 2U)
Weight	20.7 Kg (RLS: 16.7 kg, PS: 4 kg)
Material	Aluminium
Supply voltage	100-240 VAC, 50-60 Hz
Electrical consumption	< 110 W
Operating temperature	15° C to 35° C
Storage temperature	5° C to 30° C
Humidity	Maximum relative humidity 80 % for temperatures up to 31° C decreasing linearly to 50 % at 40° C.

INTERFACES

Ethernet	RJ45
Radio Frequency	SMA
Optical	FC/APC
Communication protocols	IP, SSH, SNMP

PERFORMANCES

Relative short-term frequency stability	< 3 x 10^{-17} @1 s
Relative long-term frequency stability	< 2 x 10^{-20} @103 s
Temperature sensitivity of the interferometer	< 2 fs/K

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Exail reserves the right to change, at any time and without notice, the specifications, design, function or form of its products described herein.

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