PLIEGO DE PRESCRIPCIONES TÉCNICAS

SUMINISTRO E INSTALACIÓN DE “RANDOM ANTI-REFLECTION (RAR) NANO-TEXTURED VACUUM VIEWPORTS” PARA EL LABORATORIO DE ICFO, MEDIANTE PROCEDIMIENTO ABIERTO NO SUJETO A REGULACIÓN ARMONIZADA

NÚMERO D’EXPEDIENT: 2024.SU.021

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CLÁUSULA 1. Objeto del contrato

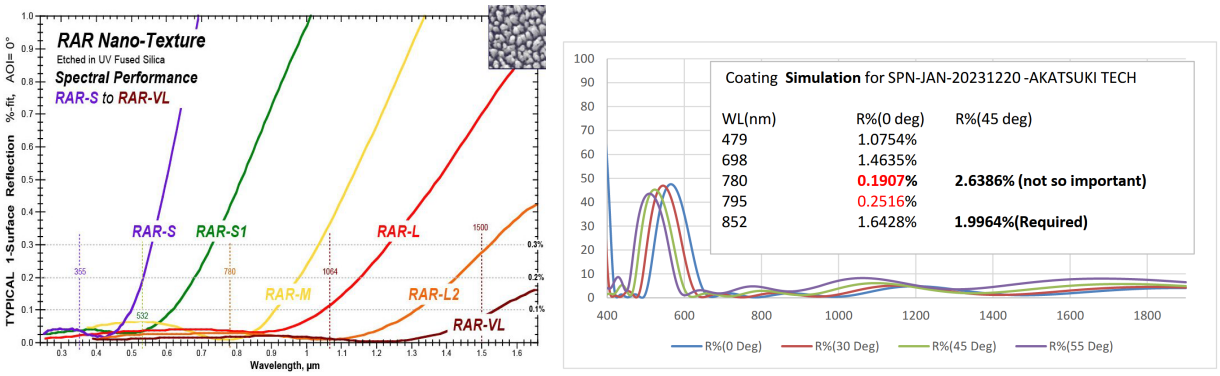
El presente contrato tiene como objetivo el Suministro e instalación de “RANDOM ANTI-REFLECTION (RAR) NANO-TEXTURED VACUUM VIEWPORTS” para el laboratorio de ICFO.

The order consists of the following objects: 4x A24850-5 (DUV (Laser) Grade Fused Silica Viewport, Zero Length Profile, **RAR-L2 nano-etching**, 0.55" Etched View, 1.33″ Conflat Flange), 5x Q28565-1 (DUV Grade (Laser) Fused Silica Viewport, Zero Length Profile, 0.63″ View Dia, **AR Coated** (Both Sides) For 780nm @ 0° AOI & 795nm @ 0° AOI, 1.33″ Conflat Flange) and 2x Q28565-2 (DUV Grade (Laser) Fused Silica Viewport, Zero Length Profile, 2.69″ View Dia, **AR Coacted** (Both Sides) For 780nm @ 0° AOI, 795nm @ 0° AOI & 852nm @ 45° AOI 4.50″ Conflat Flange). These viewports will be used to build the vacuum chamber for our experiment.

La tipología de los artículos objeto de suministro se hallan vinculados con el CPV (Vocabulario Común de Contratación Pública), **38000000-5 Equipo de laboratorio, óptico y de precisión (excepto gafas).**

CLÁUSULA 2. Needs to be satisfied with the contracting

The aim of these products is to build an octagonal metallic chamber with seven viewports in the horizontal plane and two viewports in the vertical direction, inside of which we can trap cold atoms in a magneto-optical and dipole trap. With this setup we want to do experiments with single photons (f.e. single photon generation). Most of the viewports can have a “normal” thin-film coating, which provides reflection values of a few percent depending on the wavelength and angle of incidence (AOI) of the laser beams. For three of the viewports, however, we want the loss due to reflection to be as low as possible. The reason for this is that an external cavity will be placed around the atomic cloud to enhance the light-matter interaction. Here, in order to reach a relatively large cavity finesse the losses within the cavity have to be as low as possible, because otherwise a large finesse increases the probability to lose the single photons, that will be emitted into the cavity mode. A relatively new nanotechnology, the Random Anti-Reflection Nano-Texture promises extremely low reflection values (<0.05% for large spectral ranges of several hundreds of nanometers or even <0.01% for specific wavelengths), see bottom left figure, in which the complete y-axis spans a range of only 1%. These values are much lower than the ones of thin-film coatings (see bottom right figure, where the minimal reflection values given in simulations provided by Akatsuki are about 0.2%, although they explicitly mentioned that in reality the value will rather be 0.5% according to their experience). Thus, the RAR coated viewports will allow us to go to much higher cavity finesse (~140 instead of only ~20), which will boost the efficiencies of our experiments drastically. RAR coated optics are only offered by the company TelAztec, which works together with MPF to provide RAR coated vacuum viewports. This company is therefore the only provider for this product.



Left: Reflection values of different RAR coatings. The y-axis spans a range of only 1%. The figure is taken from TelAztec’s webpage. **Right**: Simulated reflection values of a thin-film coated, provided by Akatsuki upon request.

As a remark on the quantities of the viewports we want to order: For our metallic cell we need three RAR coated viewports, however, the RAR coating is quite delicate and has to be handled with much care, which is the reason we want to order one more (in total four). For the thin-film coated 4.5”CF viewports we want to order just the amount we need and for the thin-film coated 1.33”CF viewports we also buy one more than required (in total five), just to have one spare.

CLÁUSULA 3. Technical specifications

The system needs to fulfil at least the next several features:

- Reflection value of <0.05% for 795nm for the viewports inside the cavity path
- 4x Integration of RAR coated optics into 1.33” CF viewports
- 2x 4.5” CF viewports coated with thin-film AR coating, optimized for 780nm @ 0° AOI, 795nm @ 0° AOI and 852nm @ 45° AOI (few percent of loss are tolerable)
- 5x 1.33” CF viewports coated with thin-film AR coating, optimized for 780nm @ 0° AOI, 795nm @ 0° AOI (few percent of loss are tolerable)

CLÁUSULA 4. Shipping, transport

Shipping and transport to the laboratories of Prof. Dr. Hugues de Riedmatten at ICFO must be included.

CLÁUSULA 5. Warranty

There is no warranty for the products we want to order.

CLÁUSULA 6. CE Marking

CLÁUSULA 7. Target price

Maximum of 15,861.26 Euros (Vat Excluded).

CLÁUSULA 8. Delivery time

8.1. Delivery time maximum of three months:

- Delivery time is defined as the time elapsed since the signature of the contract until the system delivery at ICFO facilities. It includes the manufacture of the system, the acceptance test at company’s premises and the transportation.

Castelldefels, a fecha de su firma digital

Prof. Dr. Hugues de Riedmatten
GL Quantum Photonics with Solids and Atoms