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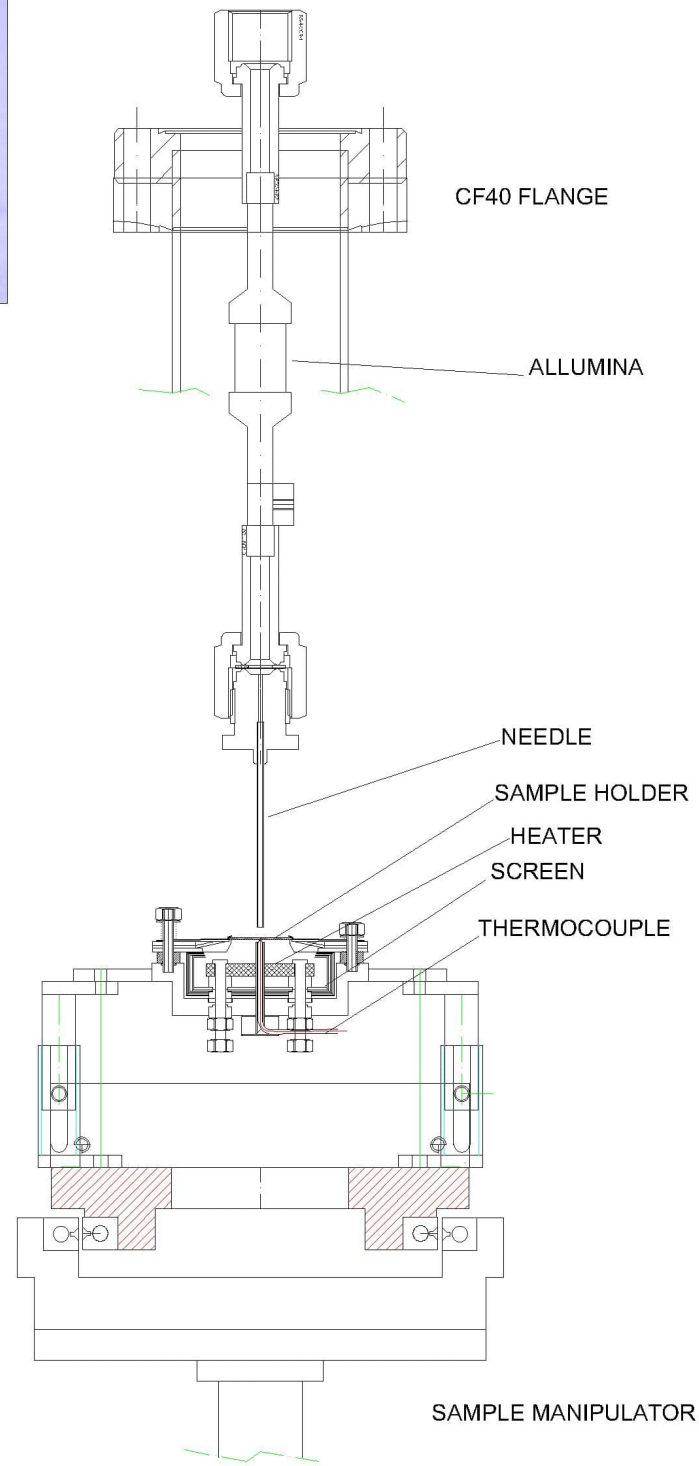
REP NEWSLETTER

Volume 01, No. 01 Jan 3, 2013

H_2 Low pressure vacuum furnace



At 1100°C and 200 mbar of H_2 on the sample surface through a polarized needle at 1Kv methane is injected. Induced electrical arc produces diamond crystals.

(sponsored by Plasma Physics Dpt of CNR – Italy)

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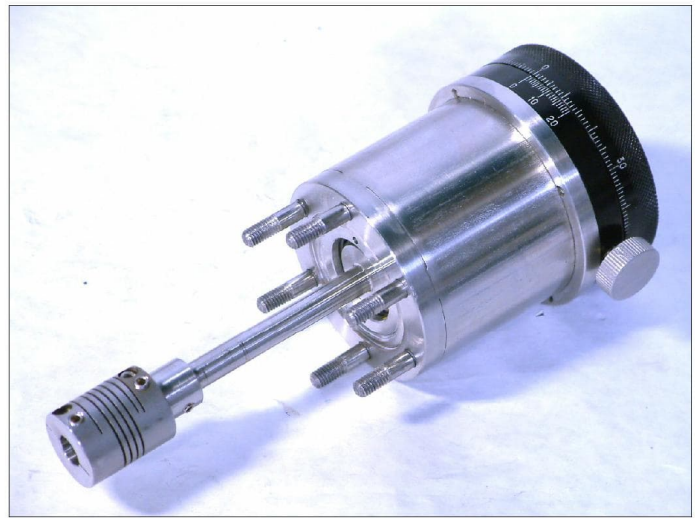
REP NEWSLETTER

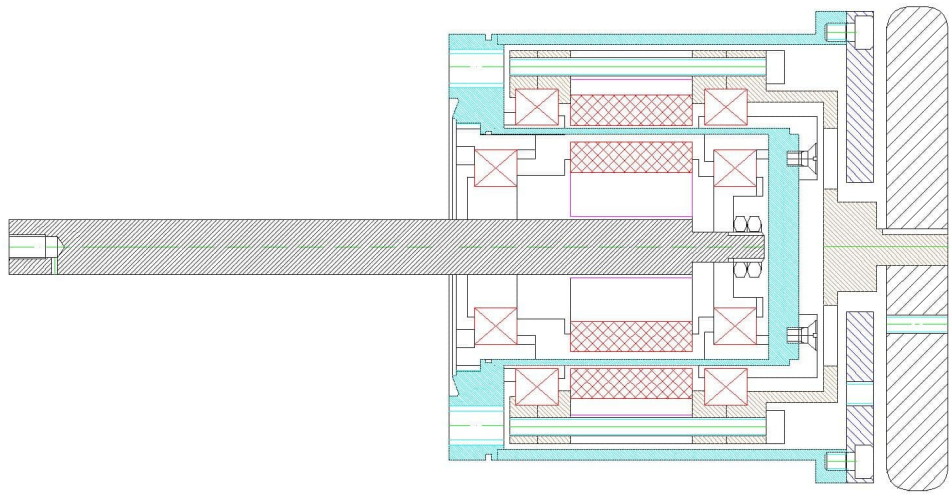
Volume 01, No. 02 Jan 10, 2013

MAGNETIC ROTARY DRIVE



- *1.4N/m couple*
- *bakeable to 300°C*
- *long life*
- *UHV applications*

These magnetic rotary drives are designed to be used in Ultra High Vacuum (UHV).
These magnetic-drive feedthroughs have solved the problems of vulnerable bellows or dynamic seals, providing an intrinsecally safe solution for the life of rotation in UHV.
The unique design of magnetic coupling circuit has evolved the range of rotary feedthroughs over the last decade.
With the application of the new magnetic materials the torque level has been increased togheter with the bake temperature: so the high torque to designed size ratios is the result of a unique magnetic coupling, which focuses the multiple magnetic fields.
In this way any stray magnetic flowlines are reduced below the earth's field, allowing the use with sensible applications as XPS and UPS.
This model has been adopted to move a sample charriot into 2.10*-11mbar Molecolar Beam Epitaxy channel



sponsored by MATERIAL SCIENCE–UNIVERSITY OF MILANO BICOCCA

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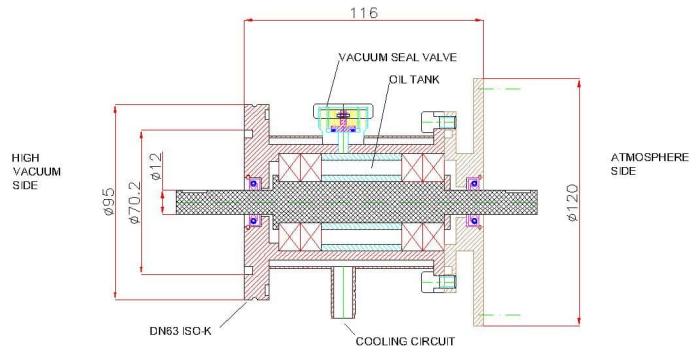
REP NEWSLETTER

Volume 01, No. 03 Jan 14, 2013

High speed rotary feedthrough



Performance and characteristics

Max speed	1800r/m
Load coef.	12 KN
Max operating temperature	90 °C
Vacuum	1.10*-7mbar
Helium leakage rate	2.10*-9mbar l/s
Applications	various rotary seals

Standard viton lip seals are adopted to obtain a vacuum in the field of 10*-7 mbar. Several stages of ball bearings in vacuum oil bath are formed to support the mechanical shaft. Each stage can sustain a load of 12KN.
Usually, the sealing part of the vacuum feedthrough consists of one lip viton seal stage.
The feedthrough fluid is high vacuum oil . A cooling cicuit mantain a constant temperature of working even in cases of very high rotary speed. So the fluid feedthrough is a long life time dynamic sealing component.
It can be used in both the positive pressure and negative pressure with very good sealing effect.

Industrial application in coating technology

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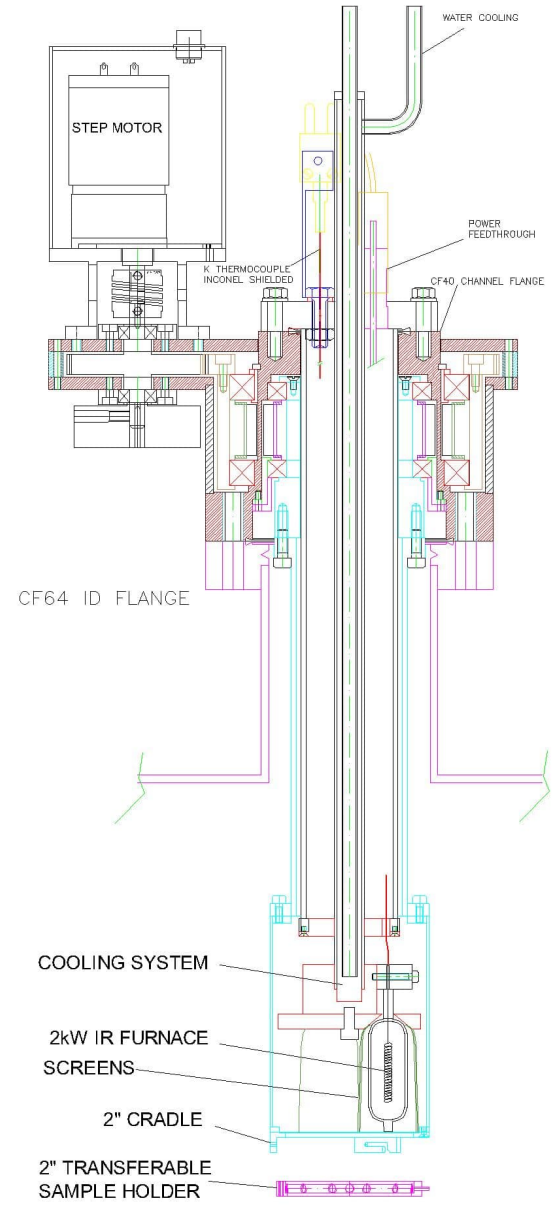
REP NEWSLETTER

Volume 01, No. 04 Jan 3, 2013

COAXIAL MAGNETIC ROTATOR

A nice application of CMRD64-40 has been realised for thin film growth.
This magnetic rotary drive is designed to be used in Ultra High Vacuum (UHV) for sputtering application, however it's also offered in some applications for molecular beam epitaxy (MBE), electron beam deposition, chemical vapour deposition (CVD) and plasma pulsed deposition (PPD).
The CMRD64-40 is available with wide range of thermocouples, cradles and heater modules, including the quartz sources.
The pricipal concept of the CMRD 64-40 series is to provide a simple stage that offers sample heating and wafer hand-off manipulation with an indipendent rotation of the sample holder.
Following the system mounting flange as the table below, the distance between the wafer cradle and system mounting flange is still specified by the customer.



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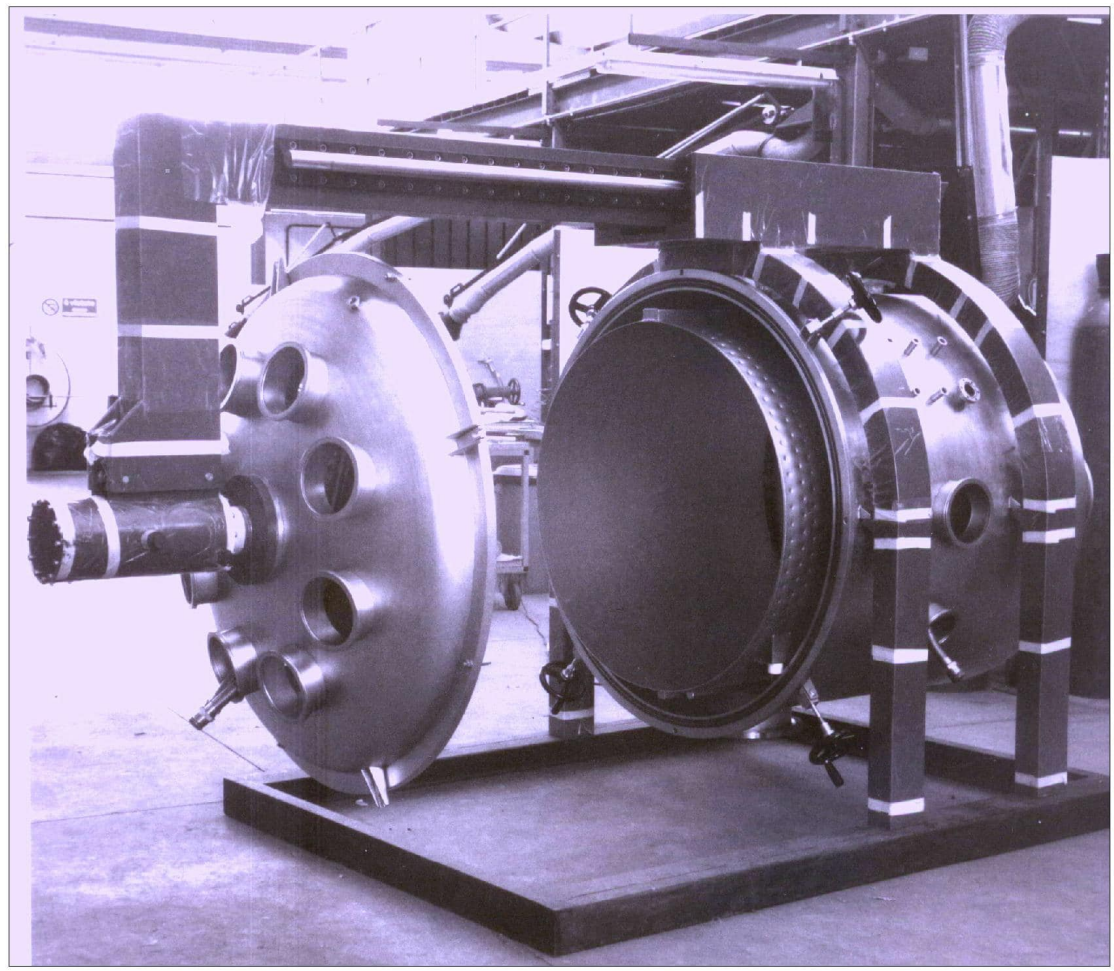
REP NEWSLETTER

Volume 01, No. 05 Feb 5, 2013

SPACE SIMULATOR



Technical notes

Ultimate vacuum	1.10*-7 mbar
Temperature range	-80°C to 100°C
Inside dimensions	ID1300mm x 1200mm
Cold plate	700 x 750mm
Shroud Emissivity	>0.93
Themal coeff. with 15kg load	>2.5 °C/min

Sponsored by Italian Space Industry

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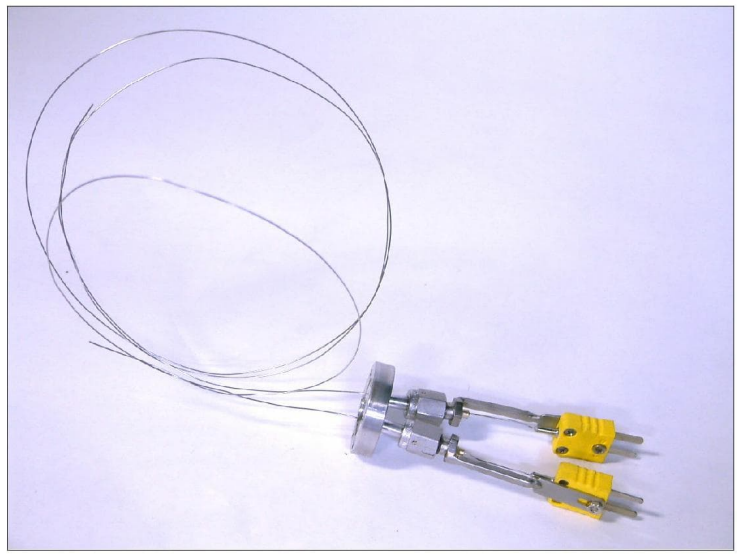
REP NEWSLETTER

Volume 01, No. 06 March 10, 2013

STRONGER THERMOCOUPLE



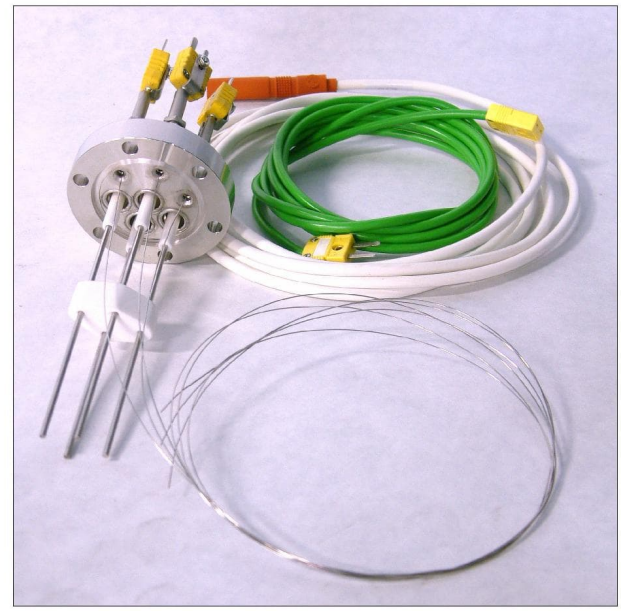
Dual dismontable K thermocouple on CF16 flange

Often research temperature measurement in vacuum is a must.
Sensible and fast thermocouples are common way to manage these signals.
Ceramic feedthroughs and thin wires are adopted.
To overpass the flimsiness and wiring difficulties ,VACUO designed a new simple mechanichal assembly.

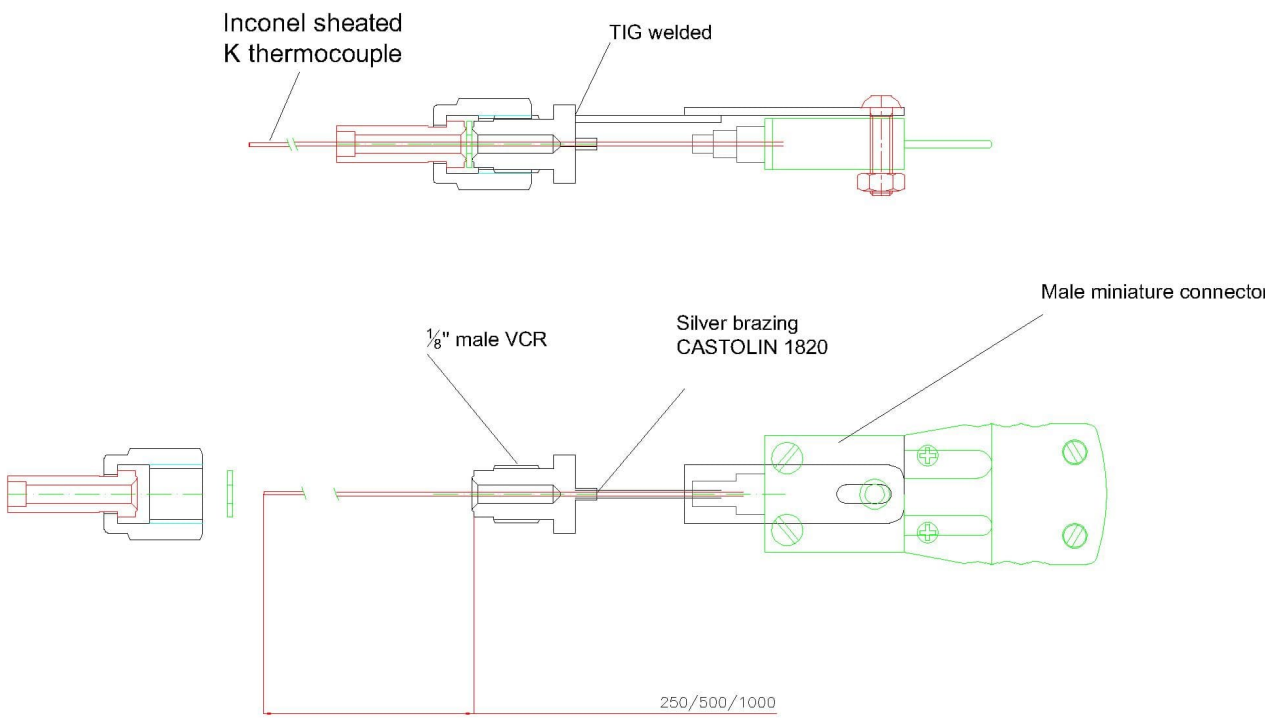
-K thermocouple ,inconel sheated ,hearth insulated, small diameter, brased on 1/8"VCR, and StSt arm to hold up the connector.

In this way the ceramic feedthroughs are excluded; strength and reliability are increased; in case of thermocouple failure the change is very simple .

Three dismontable K thermocouple on CF40 flange



sponsored by CNR - Milano



Termocoppia di tipo K secondo IEC 584 classe 2 (ASTM E 230)
-isolamento con ossido di magnesio >100Mohm e guaina in inconel 600 per temperatura fino a 1150°C
-vite di fissaggio VCR 1/8 in acc inox AISI316L,brasata con lega di argento con perdita all'elio <1.10*-9 mbar.l/sec
-lunghezze standard :250,500,1000mm
-diametri standard : 0.5-1-1.5-2 mm
-connettore maschio miniatura tipo compensato
-connettore femmina miniatura tipo compensato

K Thermocouple according to IEC 584 class 2 (ASTM E 230)
-magnesium oxide insulation >100Mohm with Inconel 600 sheating for temperatures up to 1150°C
-standard lenghts: 250, 500, 750, 1000mm
-standard diameters: 0.5-1 mm
-compensated mini male connector
-compensated mini female connector

HELIUM LEAK TEST < 5.10*−10 mbar l/s

3,2 (1,6)

Pos.	Denominazione / Denomination	Q.ta' / Q.ty	Materiale / Material	Stato / State	Dim. Grezze / Raw dimensions
1	K THERMOCOUPLE	1			

Trattamento / Treatment	Rugosita' / Roughness				
XXXX	Nuovo / New	N10	N8	N5	N2
Lavorazione / Working	Ra(um)	12.5	3.2	0.4	0.05
XXXX	PROIEZIONE EUROPEA / European Projection				

Tolleranze Generali (mm) / General tolerances (mm)							
Da A	0 6	>6 50	>50 120	>120 315	>315 1000	>1000	
	± 0.05	± 0.1	± 0.15	± 0.2	± 0.3	± 0.5	

Togliere Tutte Le Bave / Take off all burr

Sostituisce N. / Replaces

Sostituito da N. / Replaced by

Smussi NON Quotati / Unquoted grooves 0.3 x 45°

Descrizione / Description: K THERMOCOUPLE

SCALA / Scale 1 : 1

Disegnato da / Drawed by: LUIGI DALLA BELLA — Data / Date: 21/01/05

Controllato da / Cheked by: LUIGI DALLA BELLA — Data / Date: 05/01/10

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Tl. +39 (0)521 775932
e-mail : info@vacuo.net

NUMERO DISEGNO / Dwg n.: MB 101 011

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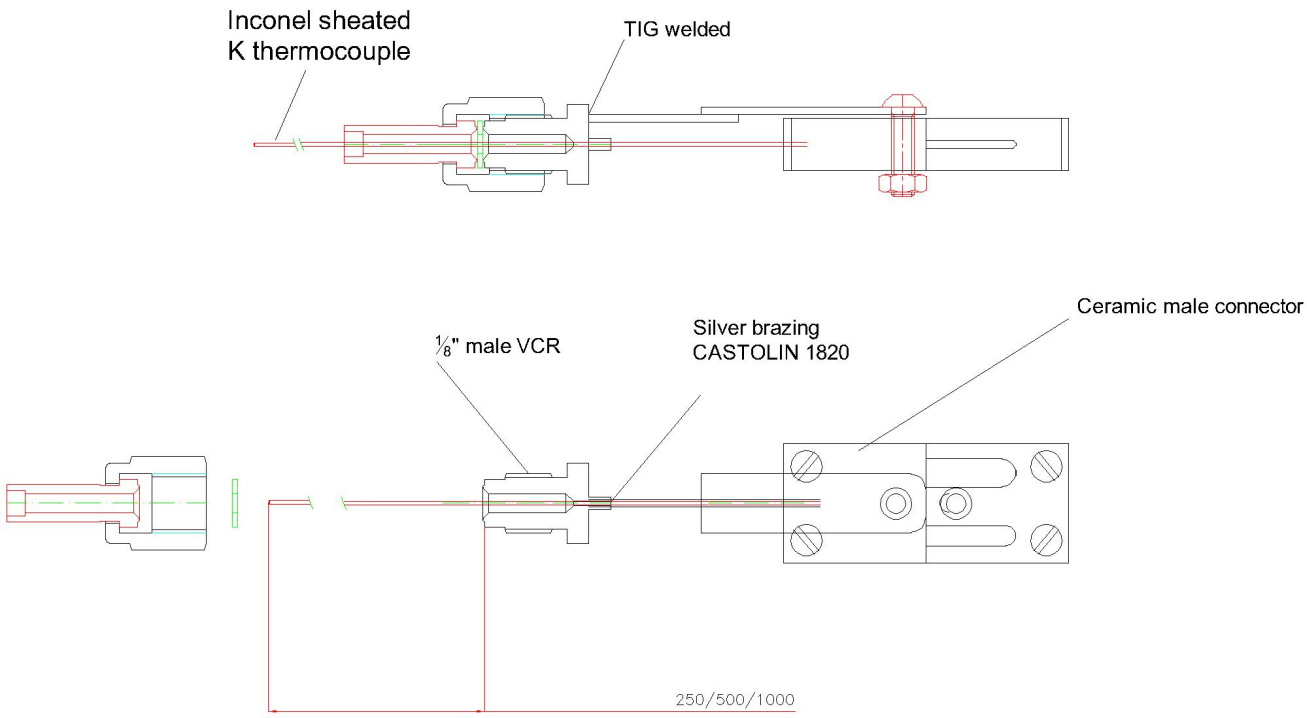

Termocoppia di tipo K secondo IEC 584 classe 2 (ASTM E 230)
-isolamento con ossido di magnesio >100Mohm e guaina in inconel 600 per temperatura fino a 1150°C
-vite di fissaggio VCR 1/8 in acc inox AISI316L,brasata con lega di argento con perdita all'elio <1.10*-9 mbar.l/sec
-lunghezze standard :250,500,1000mm
-diametri standard : 0.5-1-1.5-2 mm
-connettore maschio miniatura tipo compensato
-connettore femmina miniatura tipo compensato

K Thermocouple according to IEC 584 class 2 (ASTM E 230)
-magnesium oxide insulation >100Mohm with Inconel 600 sheating for temperatures up to 1150°C
-standard lenghts: 250, 500, 750, 1000mm
-standard diameters: 0.5-1 mm
-compensated mini male connector
-compensated mini female connector

HELIUM LEAK TEST < 5.10*−10 mbar l/s
BAKEABLE TO 450C°
UHV COMPATIBLE

3,2 (1,6)

Pos.	Denomination	Q.ta' Q.ty	Materiale Material	Stato State	Dim. Grezze Raw dimensions
1	K THERMOCOUPLE	1			

Trattamento Treatment	Rugosita' Roughness				
XXXX	Nuovo New	N10	N8	N5	N2
Lavorazione Working	Ra(um)	12.5	3.2	0.4	0.05
XXXX	PROIEZIONE EUROPEA European Projection				

Tolleranze Generali (mm) General tolerances (mm)							
Da A	0 6	>6 50	>50 120	>120 315	>315 1000	>1000
	± 0.05	± 0.1	± 0.15	± 0.2	± 0.3	± 0.5

Togliere Tutte Le Bave
Take off all burr

Sostituisce N.
Replaces

Sostituito da N.
Replaced by

Smussi NON Quotati
Unquoted grooves
0.3 x 45°

Descrizione
Description
CERAMIC CONNECTOR K THERMOCOUPLE

SCALA
Scale
1 : 1

Disegnato da / Drawed by: LUIGI DALLA BELLA — Data / Date: 21/01/05

Controllato da / Cheked by: LUIGI DALLA BELLA — Data / Date: 05/01/10

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NUMERO DISEGNO Dwg n.: MB 101 012

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VACUO
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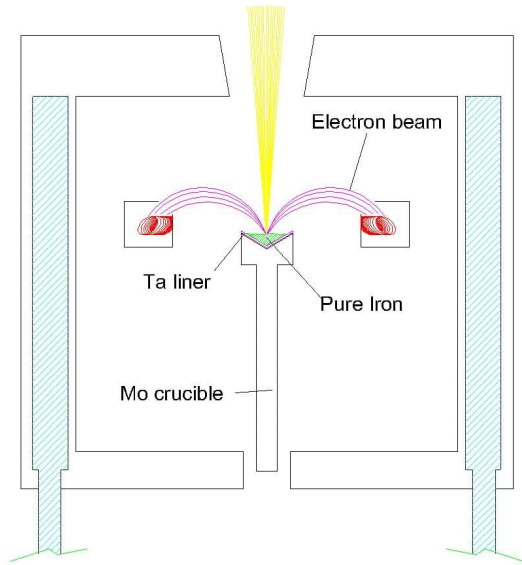
REP NEWSLETTER

Volume 01, No. 07 April 10, 2013

MINI EGUN CRUCIBLES

Mo crucibles

HUV mini egun are designed to deposit small quantity of ultra pure material as gold, platinum, nichel, silver, copper, iron.Some of these materials have a behavior different in the crucible (cracking, globularity, wettability).
To improve the yield of the film growth, different kinds of crucible have been manufactured.



sponsored by IMN–CNR BOLOGNA

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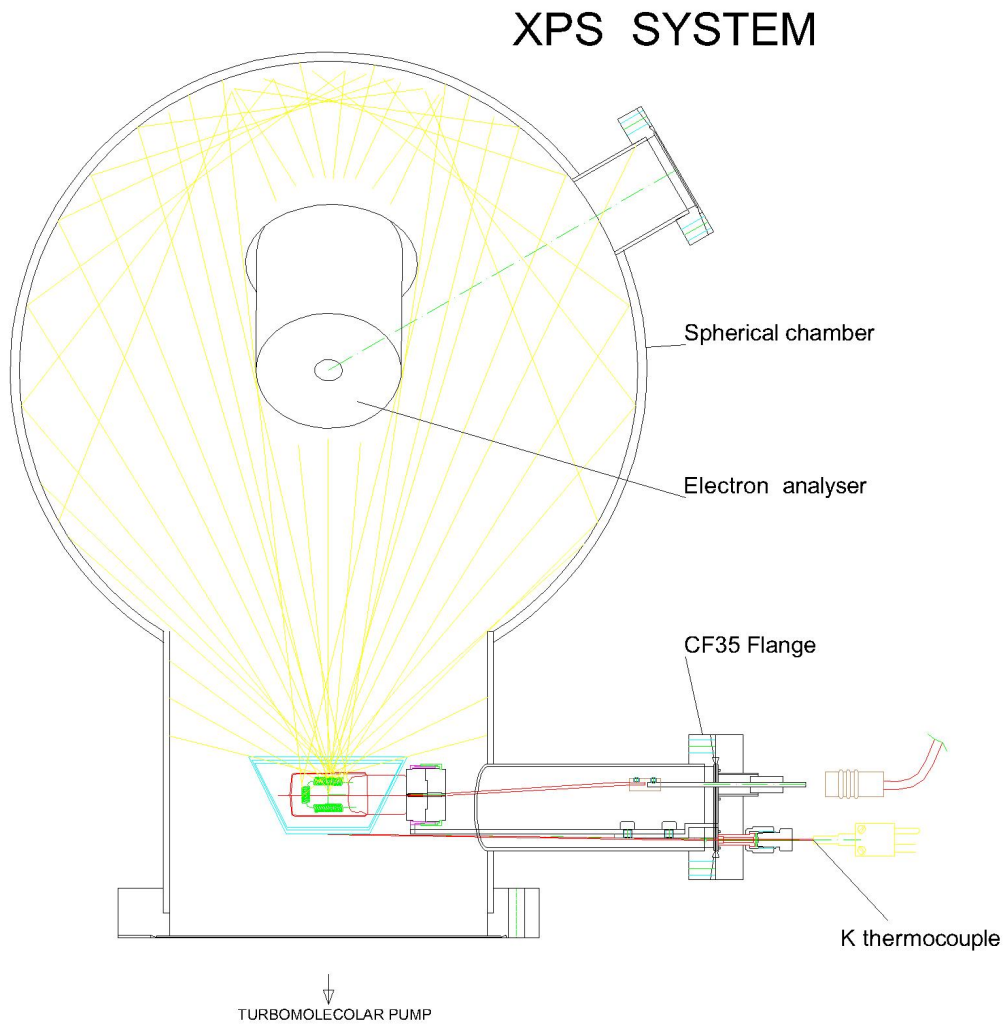
REP NEWSLETTER

Volume 01, No. 08 May 10, 2013

I.R. INTERNAL BAKEOUT

1Kw I.R. heater with K thermocouple and inconel screen

IR internal bakeout has been demonstrated very advantageous and clean (see: Newsletter Vol 4, No. 06 - May21, 2009).
In this case customer had a CF40 flange free, below of XPS system.
After simulation and discussion, a new IR heater has been designed.
After a bakeout of three days, the energy saving reached 88% of reduction, and more, the internal cleanless has been improved (RGA).
Ultimate vacuum gained a decade.



sponsored by CNR–IFP–ING GHEZZI F.

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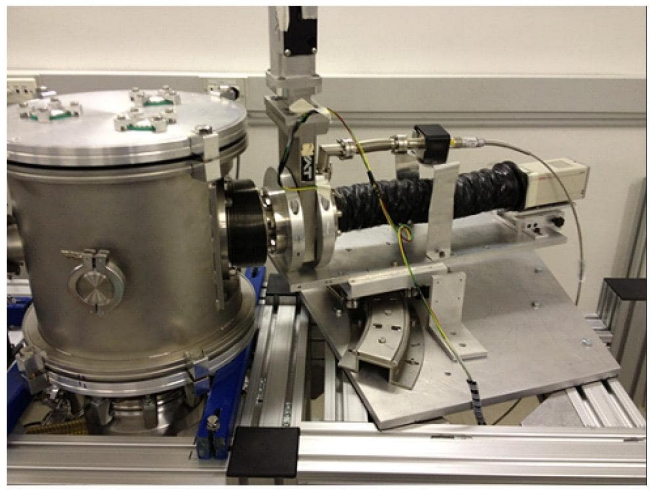
REP NEWSLETTER

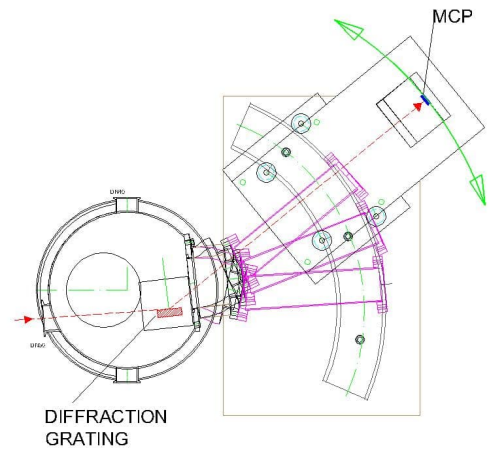
Volume 01, No. 10 June 04, 2013

ROTATING ANALYSER



This rotary wheel drives is designed in order to move a photon detector based on a Micro-Channel Plate (MCP) in Ultra High Vacuum (UHV). This system has been installed in the Ultrafast and Ultraintense Optical Science Laboratory (ULTRAS), which is a joint laboratory between CNR-Institute for Photonics and Nanotechnologies and Politecnico di Milano.

The MCP is needed for detecting and amplifying the high energy photons coming from the interaction of an intense and ultrashort laser pulse with a gas target in vacuum, during a process called High-order Harmonic Generation (HHG). Since the spectra of the emitted light contains information about the molucules in the target, a diffraction grating is used in order to spatially separate the differnt wavelengths, that are observed by means of the MCP itself. In particular, by analayzing the HHG photons at different wavelengths, it has been possible to "take a picture" of the molecular orbital, i.e. the electronic distribution around the nuclei, of molecules like carbon dioxide or acetylene. This "picture" can be even more accurate if could access to a broader spectral range during the detection of the emitted light. This can be achieved by moving the detector with respect to the diffraction grating. The system developed and realized by VACUO, allows a real-time tuning of the spectral window that can be observed during the experiments, without the need to break the vacuum, thus allowing the acquisition of a complete HHG spectrum and improving the quality of the experimental result.



sponsored by : ULTRAS - Politecnico di Milano - Dr.ssa Vozzi Caterina

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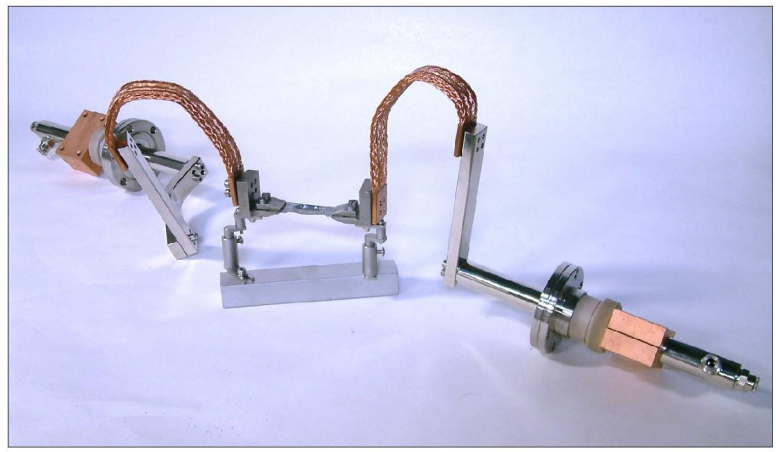
REP NEWSLETTER

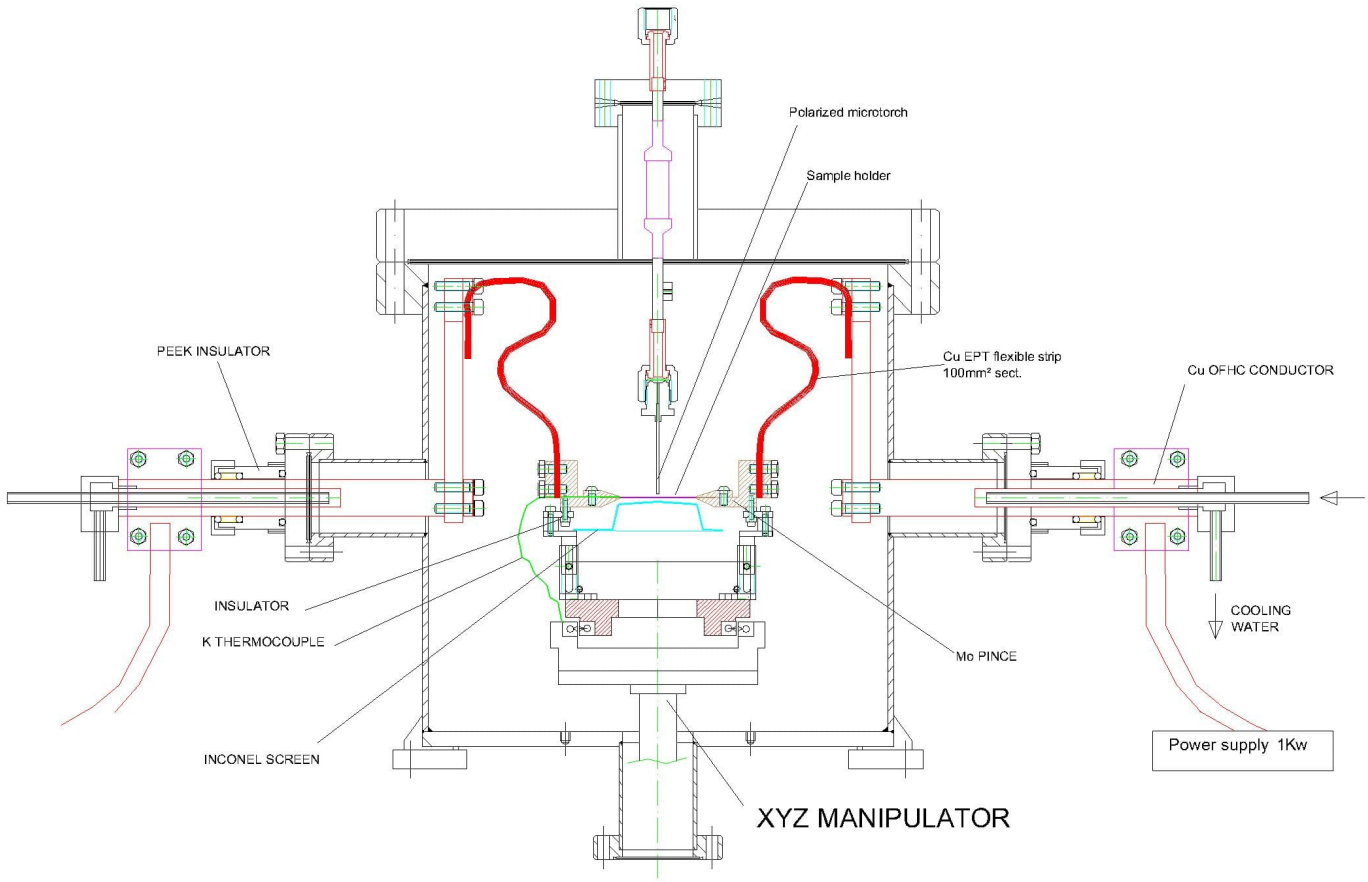
Volume 01, No. 11 June 14, 2013

MOVABLE JOULE HEATER



Moving joule heater

Vacuum evaporation systems are generally realized with a fixed sources and a moving sample holder.
In this case we have replaced a hot filament source with a movable joule effect source.



sponsored by CNR-IFP Milan - Ing. F. Ghezzi

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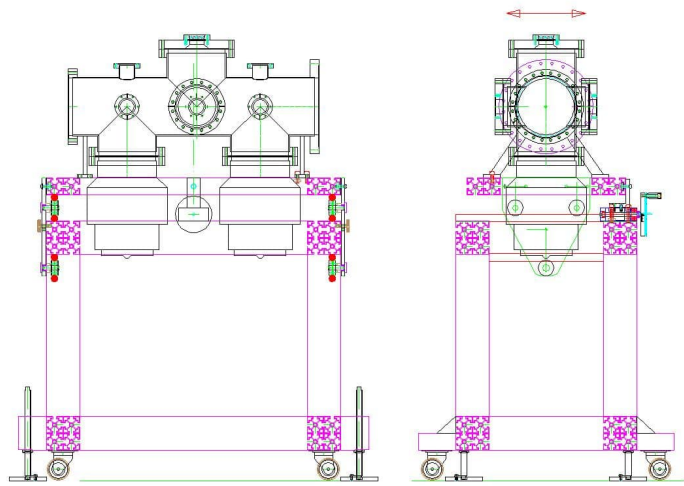
REP NEWSLETTER

Volume 01, No. 12 August 28, 2013

VMI CHAMBER

This vacuum chamber,equipped with a traslation stage, is designed to accomodate a Velocity Map Imagin (VMI) spectrometer.The system has been installed in the "Laboratory for Attosecond Science" at the Physics Department of Politecnico di Milano.
Extreme ultraviolet (XUV) attosecond (1 as=10^-18s) pulses are generated by frequency conversion of ultrashort laser pulses in gas through a high non-linear process called "High-order Harmonic Generation".
These ultrashort pulses are exploited to follow and control the elctron dynamics occurring in atoms and molecules after photoionization. In order to study the dissociative dynamics triggered by XUV attosecond pulses a VMI spectrometer is required.This spectrometer allows measuring the momentum distribution of the photofragments (ions or elctrons) produced by photoionization of atomic and molecular targets.The XUV beam is focussed in the center of the VMI spectrometer inside a gas jet and a sequence of properly designed electrodes accelerate the produced fragments towards an MCP detector coupled to a phosphor screen and a CCD camera to record the momentum distribution of the photofragments. In order to produce a symmetric distribution, the XUV focus has to be positioned precisely in the center of the VMI chamber. The system realized by TECNA is designed to move the chamber along the laser focus in vacuum , thus allowing online optimisation of the VMI signal without breaking the vacuum.



sponsored by : LAS - Politecnico di Milano - Dr.ssa Francesca Calegari

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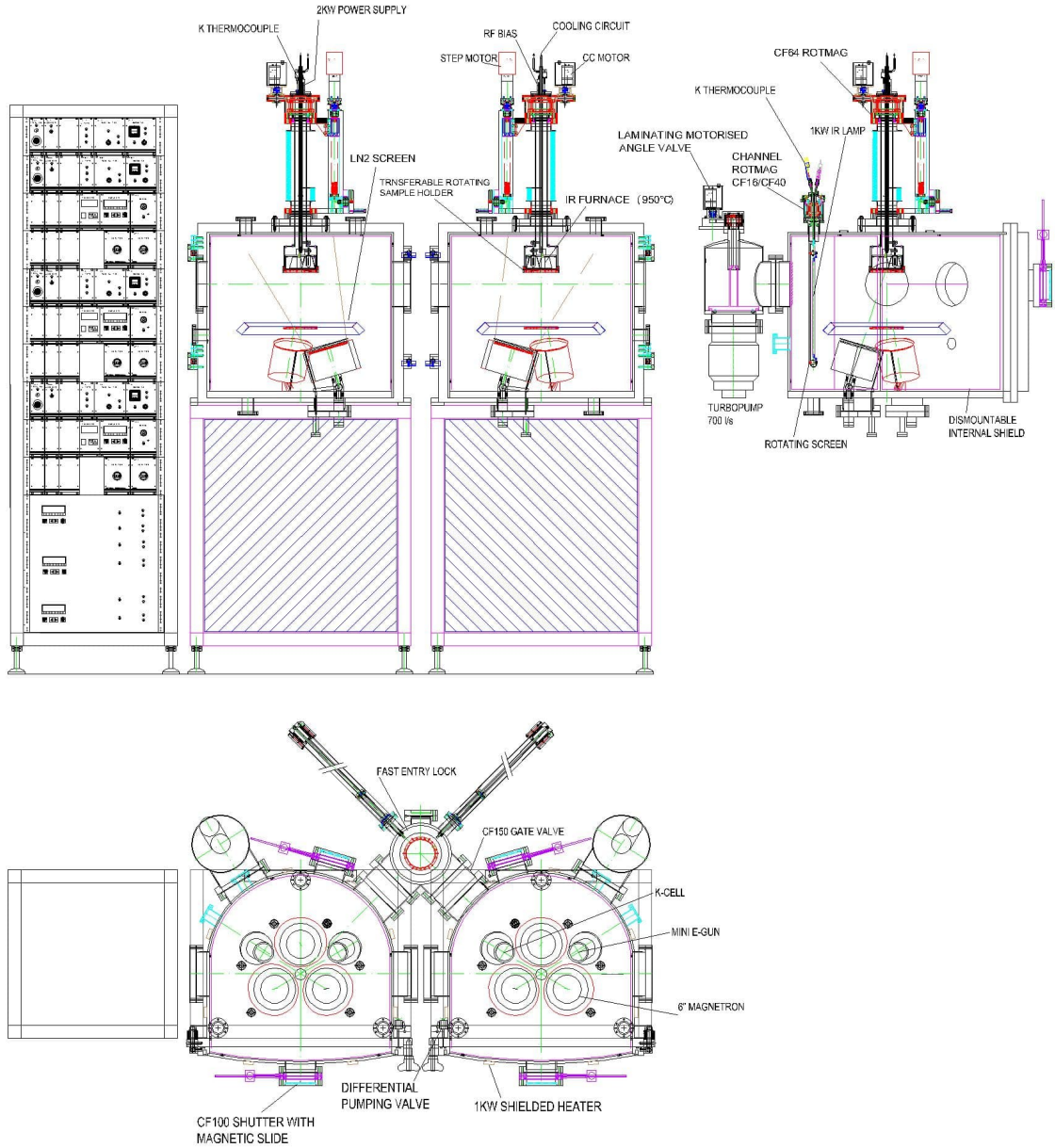
REP NEWSLETTER

Volume 01, No. 13 September 10, 2013

4" DUAL SOURCES SYSTEM



Multichamber system is designed for thin films RF co-sputtering of semiconductor(intrinsic and doped) and dielectric materials, as well as metals by DC sputtering, named TWIN COATER (TC). TC is realized with two StSt chambers (BOXCOATER) connected by a fast entry lock (FEL) that allows to transfer the 4" samples without breaking the vacuum.
The first BOXCOATER is particularly arranged for oxide growths with presence of gas as argon, nitrogen, oxigen, whereas the second one is more equipped for nitrides with presence of gas as argon and nitrogen.
Bakeable sample holders are assembled on continuous rotating manipulators in the central axis till 950°C.
IR internal bakeout allows to maintain clean the surface of inside shrouds.
Made by ultra high vacuum technics, with suitable pumping system, attainable ultimate vacuum is in the low range of 10*-8 mbar.
TC running is managed by PC both for the processes and the vacuum systems.

sponsored by : Politecnico di Torino

VACUO
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REP NEWSLETTER

Volume 01, No. 14 August 28, 2013

DEWAR

High vacuum application concern also restoration service.
When a big bottle of champagne, as Jeroboam or Magnum, require a long ice cooling , suitable dewar vases are required.
Our sense of taste is the most reliable tool of the temperature of the Champagne: poured into a very thin, tulip shaped flute, it just looks cool thanks to the eyes by virtue of the mist that crows along the glass.
Champagne is at its finest and most expressive when you have stood the bottle in a dewar with ice for half an hour, and served at a temperature of 6-8°C.
Our sense of touch is also the source that we call "mouthfeel", or the texture of the fizz on the palate.
After some year restoring the vacuum is possible by a gas-tight valve.

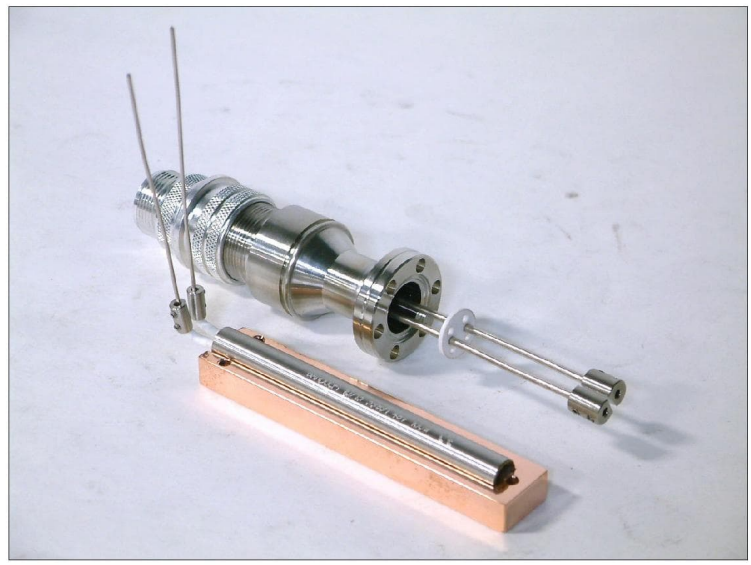
High vacuum restoring valve

VACUO
engineering for research

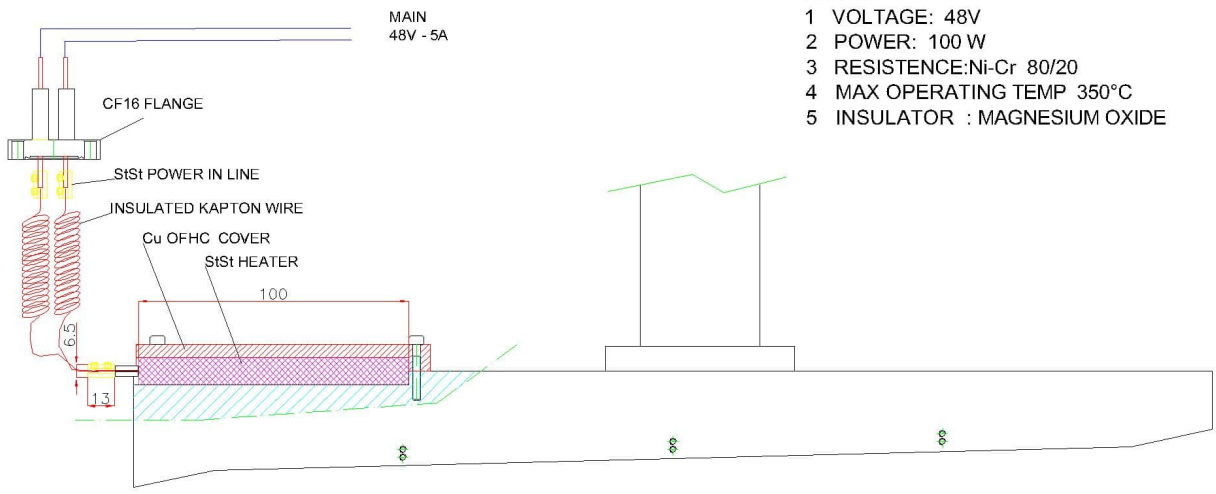
REP NEWSLETTER

Volume 01, No. 15 October11, 2013

SCRAPER HEATER



An ion scraper has been designed at GANIL-SPIRAL 2 - Caen France.
To outgas the scraper a special tubular heater has been manufactured to maintain the temperature over 100°C during the operations in UHV.



NOTES
1 VOLTAGE: 48V
2 POWER: 100 W
3 RESISTENCE:Ni-Cr 80/20
4 MAX OPERATING TEMP 350°C
5 INSULATOR : MAGNESIUM OXIDE

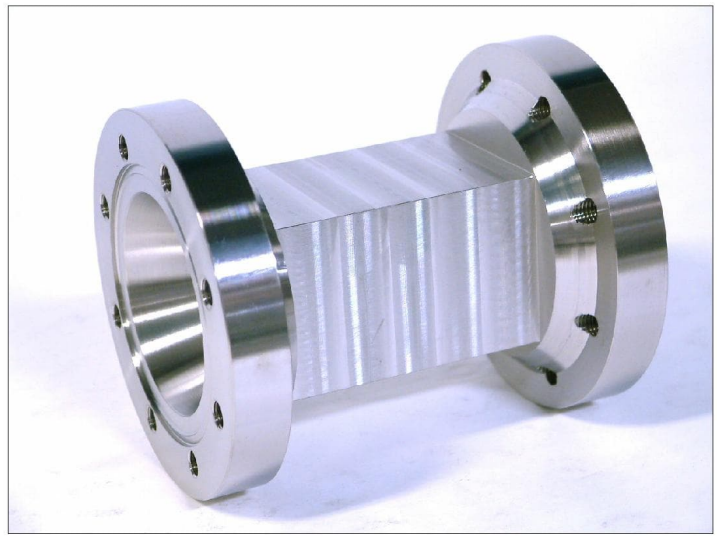
sponsored by : GANIL- SPIRAL 2 - France

VACUO
ULTRA HIGH VACUUM
CRYOGENICS ENGINEERING

REP NEWSLETTER

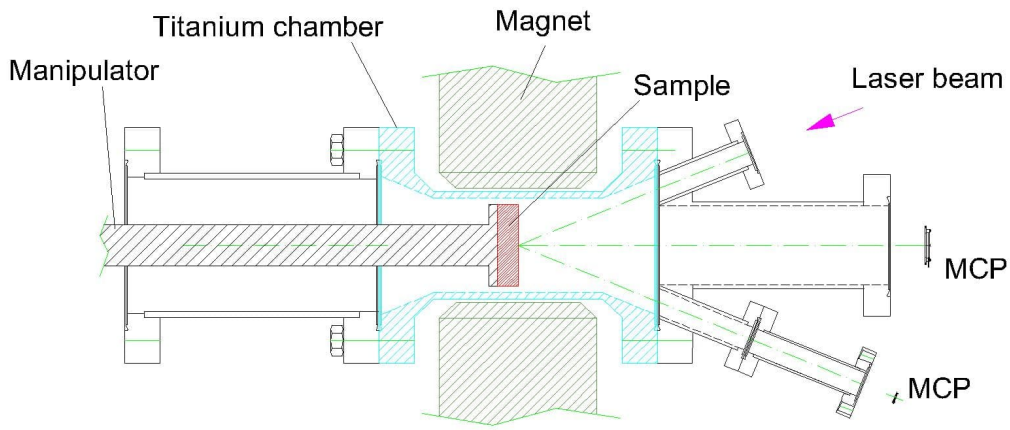
Volume 01, No. 16 October 21, 2013

MOKE CHAMBER



Titanium amagnetic chamber

In physics, surface magneto-optic Kerr effect (SMOKE) is a very powerfull technique in the study of surface magnetism being highly sensitive to the magnetisation within the first ten nanometers. Others advgantages of the MOKE are the high accuracy, the high temporal and spatial resolution and simplicity.
The magneto-optic effect describes the change of polarization state of a linearly polarized light after the reflection from a magnetised surface.It is used in materials science research for studying multilayered and patterned systems and in device such as the Kerr microscope to investigate the magnetization structure of materials.
An amagnetic titanium chamber has been designed to insert between the polar expansion to perform compounds characterisation.



sponsored by : CNR - IOM Istituto Officina Materiali - Drssa Roberta Ciprian

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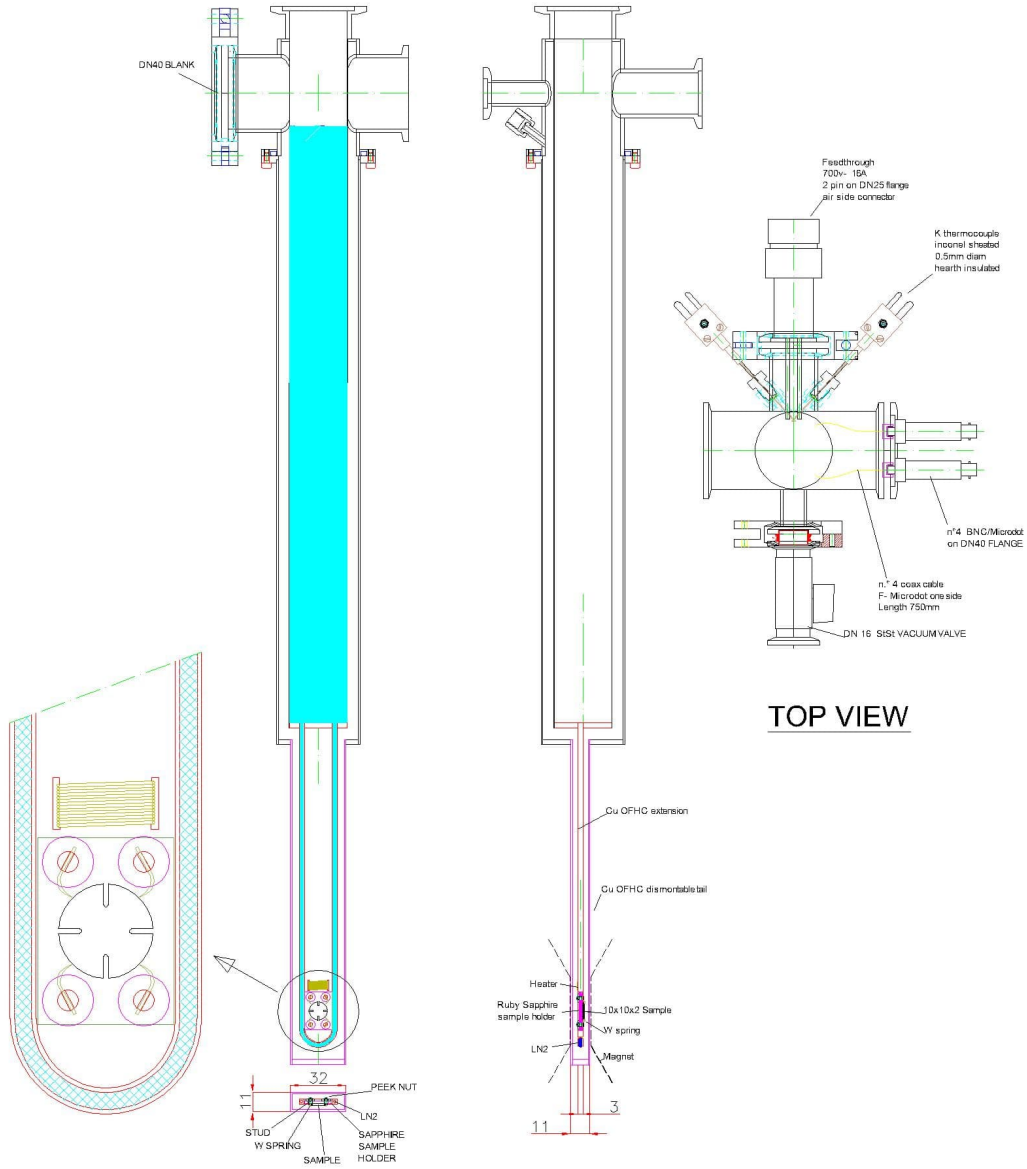
CRYOGENICS ENGINEERING

REP NEWSLETTER

Volume 01, No. 17 October 21, 2013

HALL EFFECT

The Van der Pauw method is one of the most effective and widely used methods of the four-probe mode of determining the resistivity and Hall effect of materials in the form of thin films.
A suitable LN2 cryostat with variable temperature has been designed to do experimental measurements in short time.



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CRYOGENICS ENGINEERING

REP NEWSLETTER

Volume 01, No. 18 November 20, 2013

MBE CHAMBER

For Molecolar Beam Epitaxy (MBE) ultra high vacuum is a must.
To reduce the surface outgassing, internal wall of the chamber has been polished.After bakeout ultimate vacuum reach 10*-11mbar.
Multilayer thin films are performed on four axis sample holder.
The chamber has been designed to host several evaporatioin sources that will evaporate onto the sample through shadow mask to obtain microstructures with lateral size of 100 micron.
The MBE chamber will also equipped with LEED for structural characterisation of the sample surface and in-situ MOKE system for the study of magnetic anisotropy of grown films. This MBE system is devoted to the preparation and characterisation of multilayers with possible application in spintronics.

sponsored by : CNR - IOM Istituto Officina Materiali - Dr Piero Torelli

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CRYOGENICS ENGINEERING

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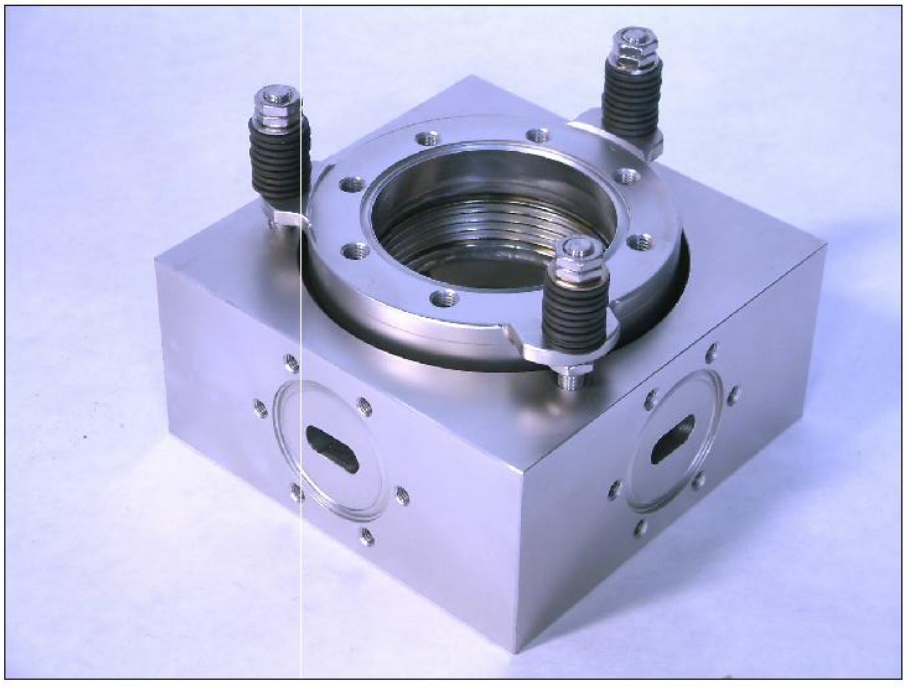

Dual Cryostat Vacuum Chamber for High Average Power Titanium:Sapphire Amplifier

This chamber is an integral part of a high average power titanium:sapphire laser system.To overcome the debilitating drawback of thermal lensing in a titanium: sapphire crystal (caused by strong optical pumping with 532nm pump lasers), the crystal needs to be cryogenically cooled and mantained in a high vacuum environment. This chamber allows us to connect two cold helium cryostats to a copper mount , which holds the titanium:sapphire crystal.
The additional cooling capacity of a second cryostat can allow for very high optical pumping of the titanium:sapphire crystal without experiencing a significant thermal lens. This can result in a very high gain amplifier with a good beam quality.
To improve the mechanical behavior of the chamber and to lower the outgassing rate a forged block of 316LN ESU stainless steel has been machined. The operating ultimate vacuum is in the field of 10*-8mbar.

sponsored by : ICFO -Barcelona-Seth Cousin