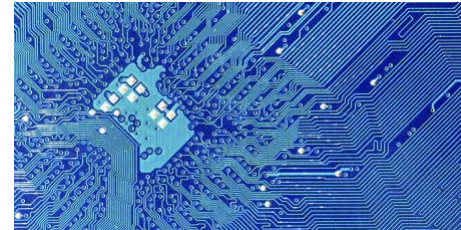


# ULTRAFAST LASERS

AVANCES EN I+D Y APLICACIONES INDUSTRIALES



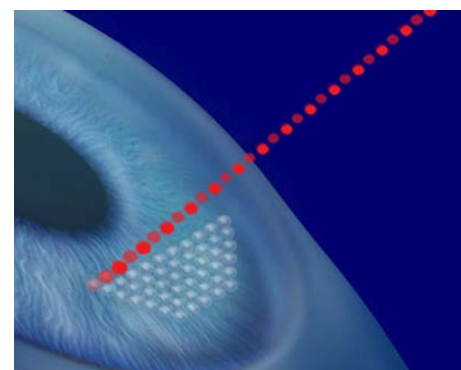
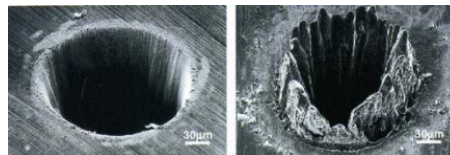
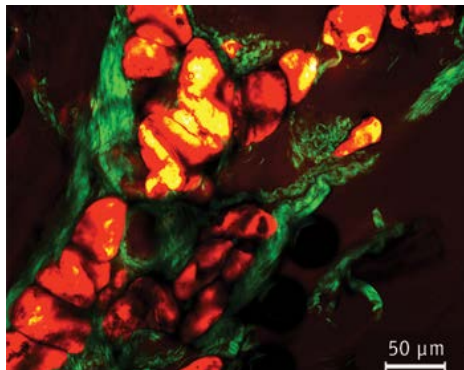
## “Láseres ad hoc”



CENTRO DE  
LÁSERES  
PULSADOS



Southern European Cluster  
in Photonics and Optics



## ICTS: Instalación Científico-Técnica Singular

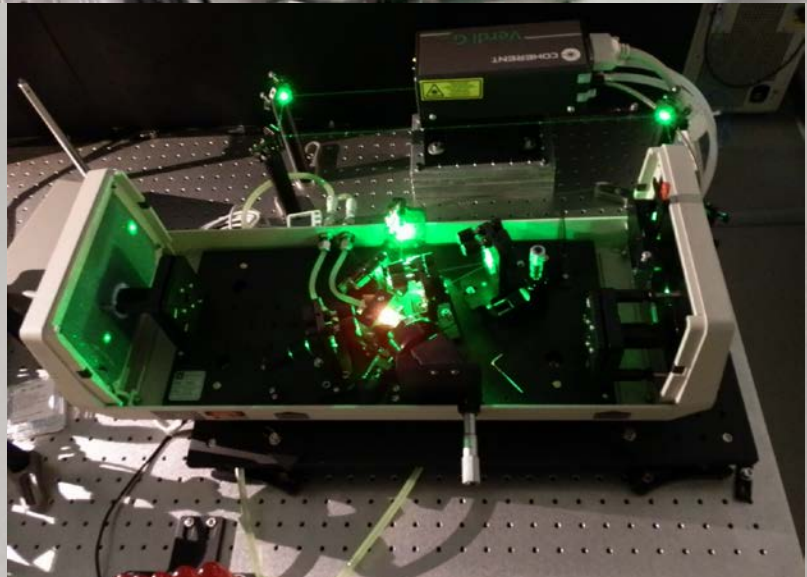
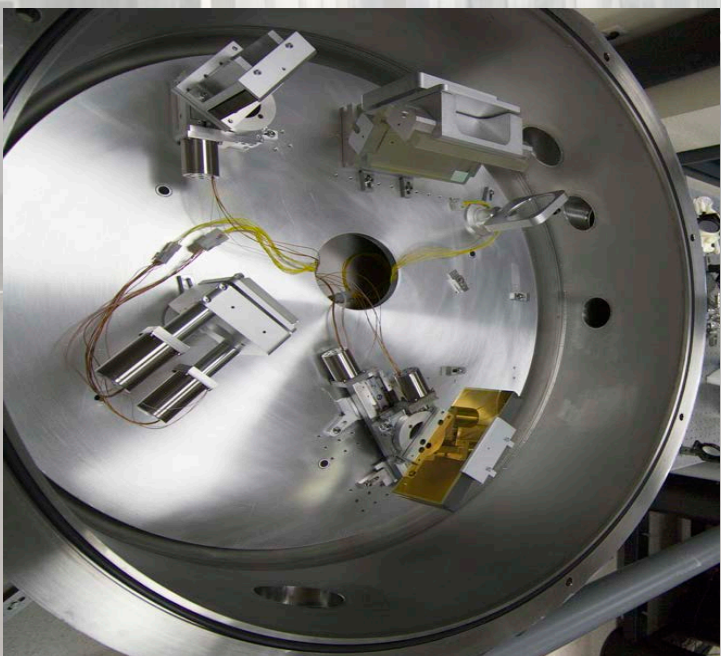
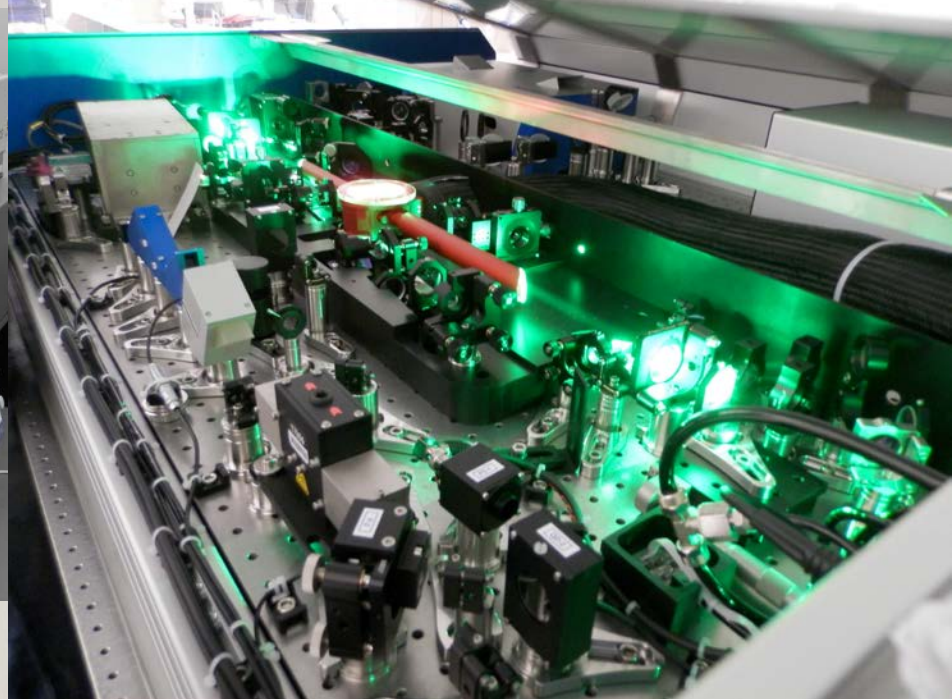


Usuarios: Empresas y Centros Investigación

## **CENTRO DE LÁSERES PULSADOS ULTRAIINTENSOS ULTRACORTOS - CLPU**

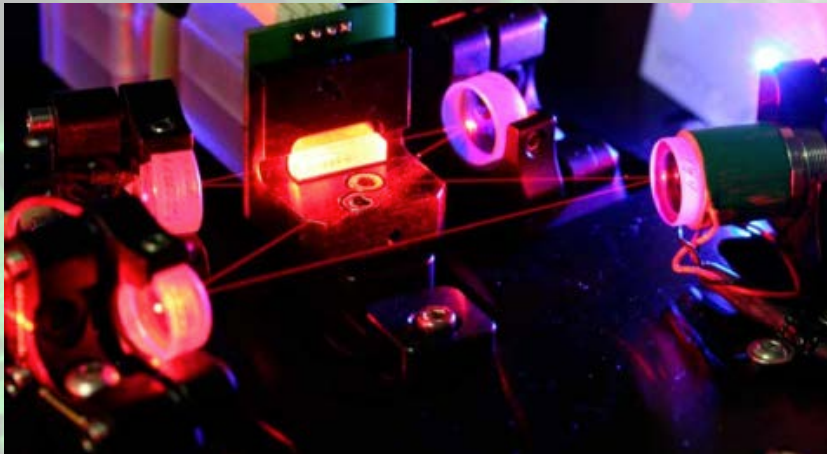
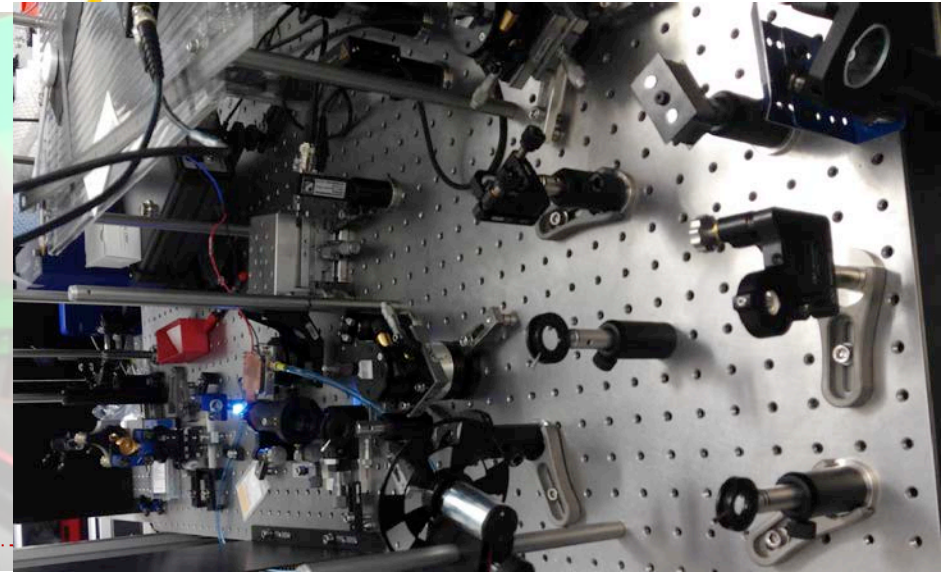
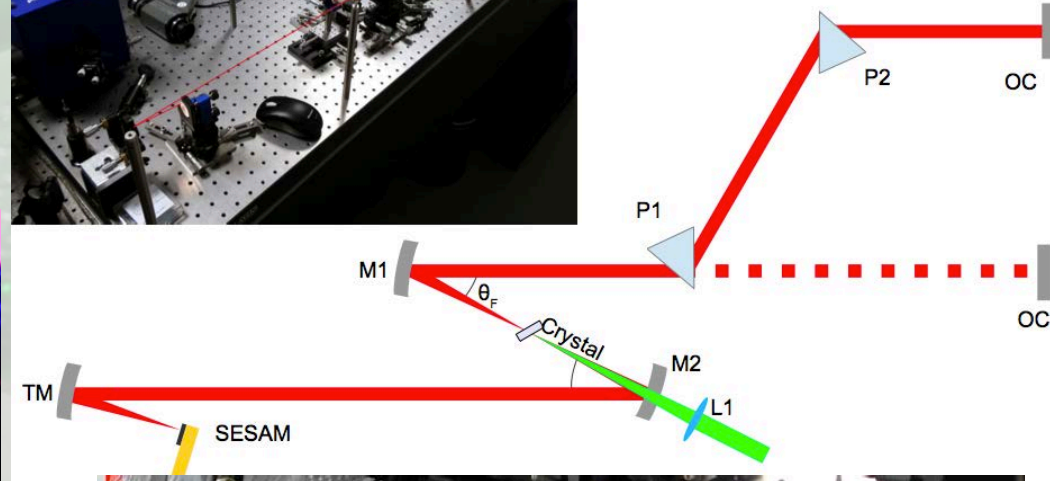
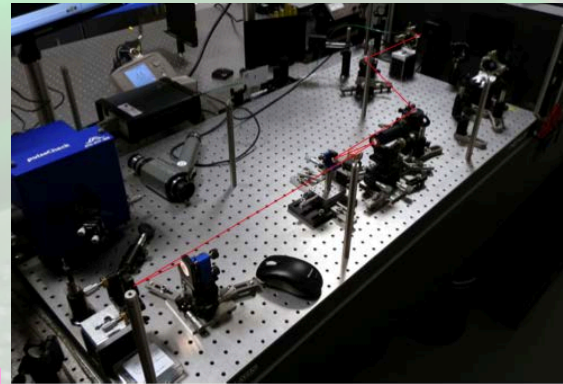
- 800 nm, 1030 nm y armónicos
- 6 fs – ps
- Potencia promedio 1W –  $10^{15}$  W
- 1 mJ – 30 J







Láseres ad hoc?? Necesidades específicas de un específico uso.



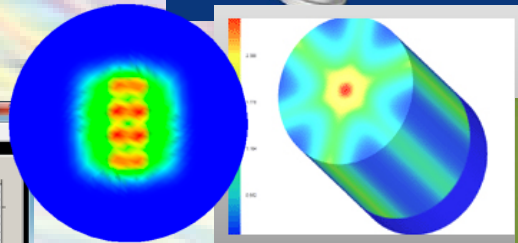
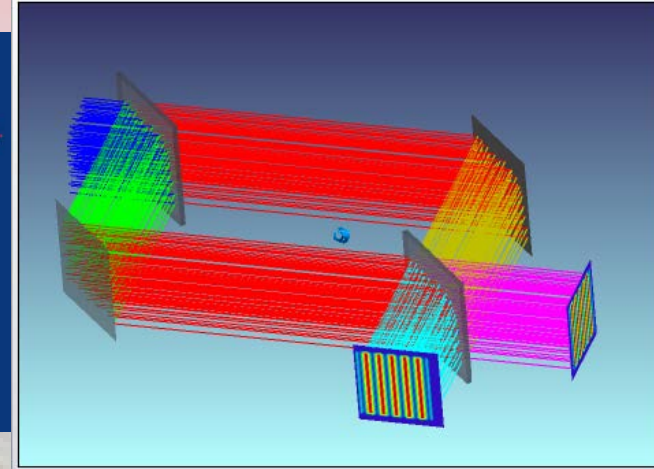
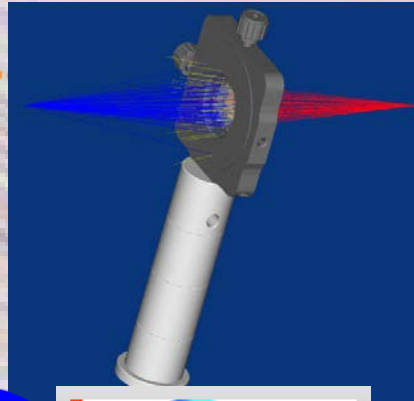
### Diseño de osciladores láser y amplificadores.



OpticStudio<sup>TM</sup> 14.

Matlab  
Mathematica

...



TiCa Simulation: Cavity Power

**Simulation Parameters**

<b>Precision</b>	<b>Cavity</b>
Npts (2 <sup>n</sup> ) 11	wlmit_c (um) 50
Error 0.005	wlmit_p (um) 50
<b>Crystal</b>	Z1_c (cm) 0.5
sigma (10 <sup>-15</sup> cm <sup>-2</sup> ) 3	Z1_p (cm) 0.5
tau (us) 3.2	T_OC (%) 3.5
lc (cm) 1	eta (%) 2
<b>Pump Beam</b>	<b>Fundamental Beam</b>
Lambda_p (nm) 832	Lambda_c (nm) 800
alpha_p (cm <sup>-1</sup> ) 2.5	alpha_c (cm <sup>-1</sup> ) 0.005
n_p ( ) 1.76	n_c ( ) 1.77
Ppump (W) 15	

**Static Parameters**

FOM ( ) 313
L_cav (cm) 0.26
P_cavity (W) 79.57
P_out (W) 2.785

Calculate

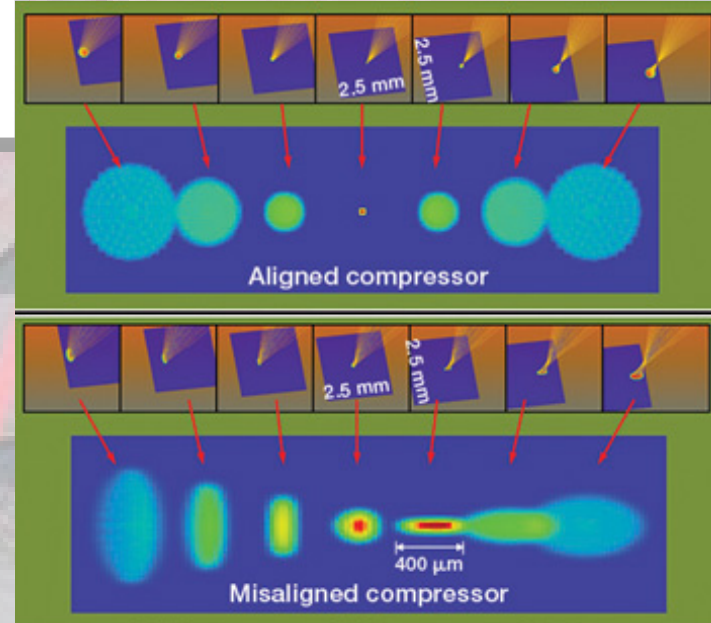
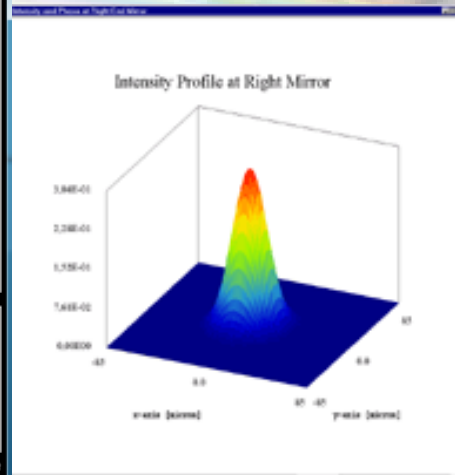
**Sweep**

<b>Fine Sweep</b>	<b>Coarse Sweep</b>
Crystal FOM	FOM
Min 0.2	Min 50
Max 3.5	Max 500
Npts 50	Npts 5

Save Plot  
Save Data

**P<sub>OUT</sub> vs. Crystal Length vs. FOM**

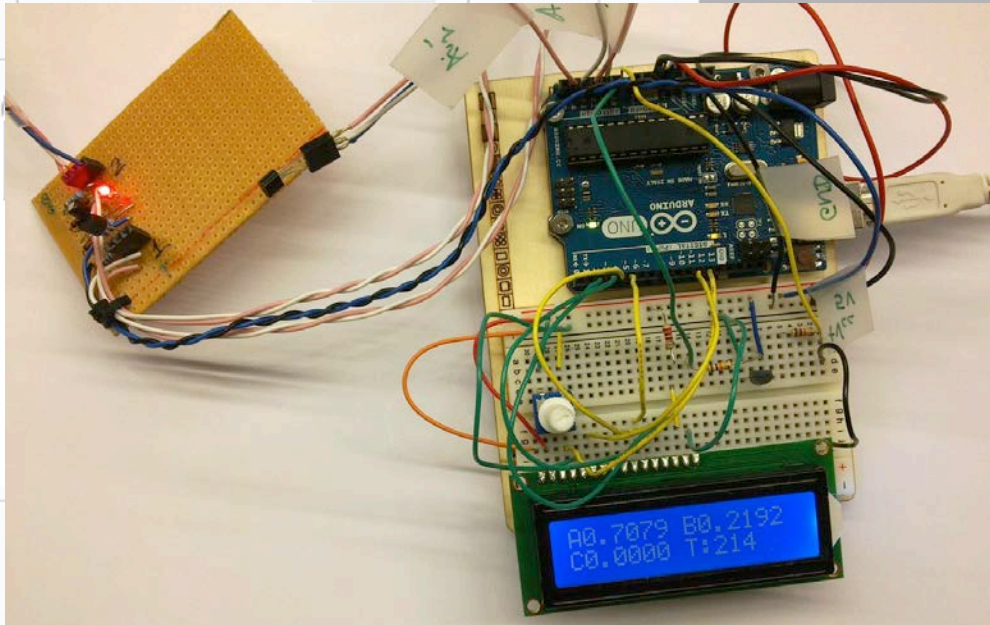
FOM	Crystal Length (cm)	P <sub>OUT</sub> (W)
50.0	0.5	1.8
162.5	1.0	3.2
275.0	1.5	3.8
387.5	2.0	4.1
500.0	2.5	4.0



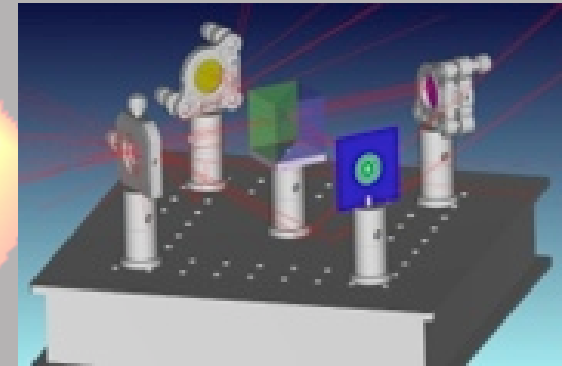


## Integración y diagnóstico

Raspberry pi, Arduino



Solidworks-CAD



Centro de mecanizado 5 ejes

Labview  
control y automatización

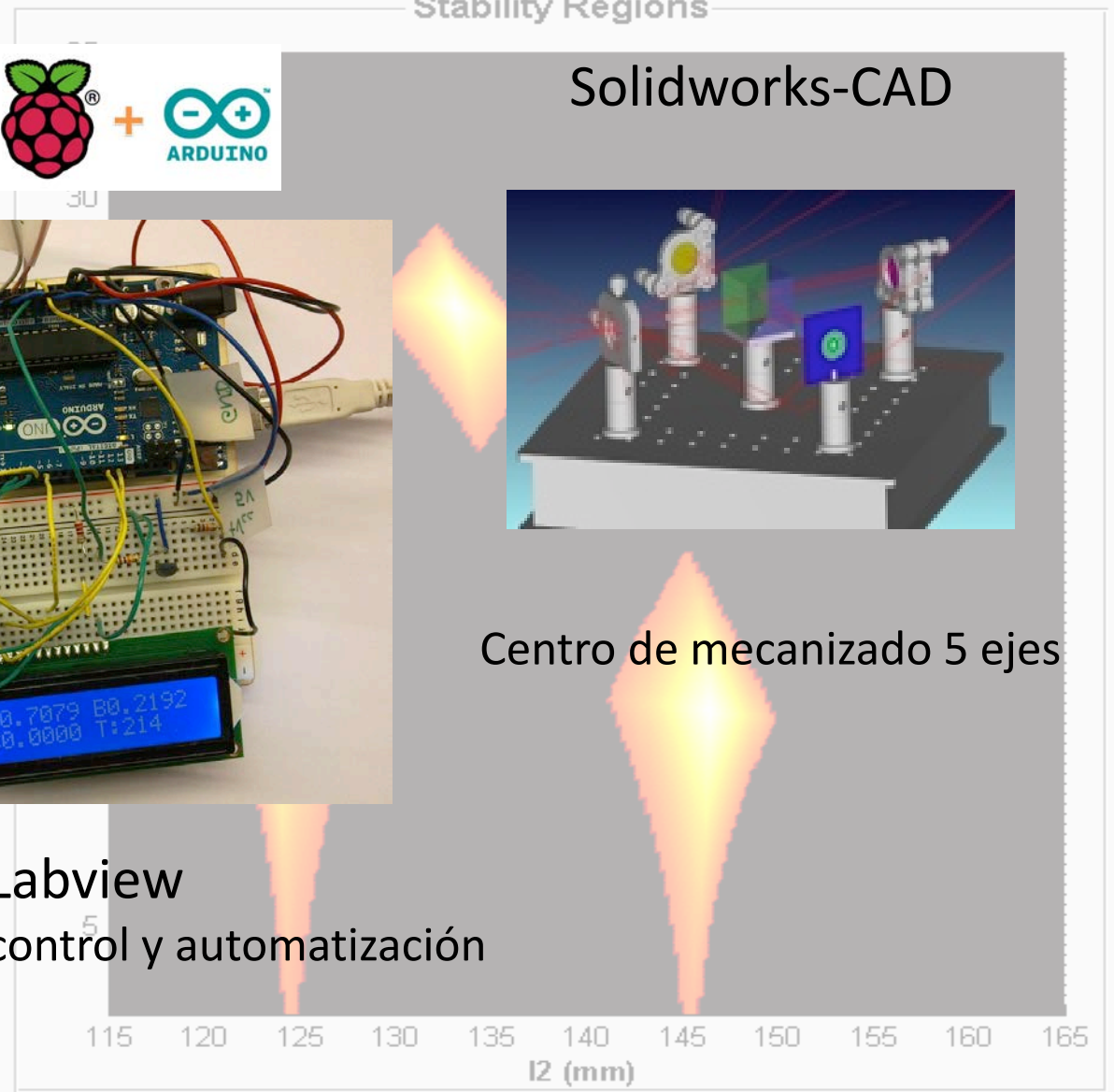
Cavity Parameters

Crystal Length(mm)	21
Crystal Index ( )	1.75
Arm l3 (mm)	400
R (mm)	110

l2 max (mm)	165
theta min (deg)	2
theta max (deg)	35

Progress 99.7

Run Exit



### Integración y diagnóstico

Medida de pulsos y desarrollo de autocorreladores.

#### TiSa Stability Regions

##### Cavity Parameters

Crystal Length(mm)	21
Crystal Index ( )	1.75

	35
	30

R (mm)	110
--------	-----

#### Stability Regions

#### Cavity Scheme

$\theta$ min (deg)	2
$\theta$ max (deg)	35

Progress 99.7

Run
Exit

Espejos del interferómetro

Iris de Alineamiento

Divisor de haz

Filtro coloreado

BBO

Fotodiodo

Iris de Alineamiento

Retardo motorizado

Espejos de Entrada

115 120 125 130 135 140 145 150 155 160 165

$l_2$  (mm)

## INNFACTOS

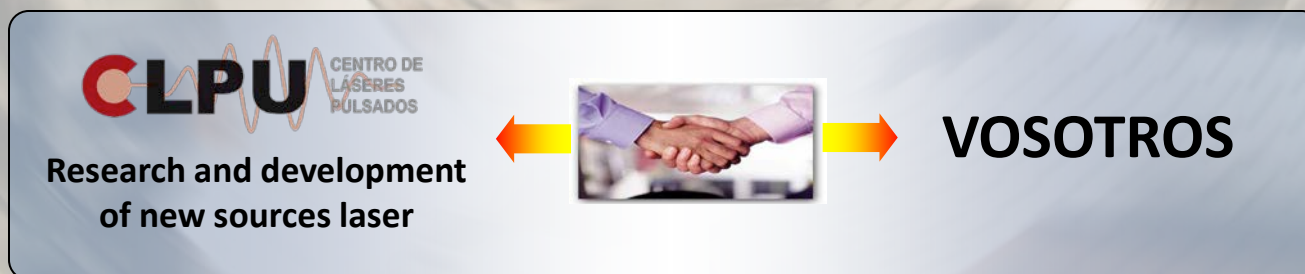
Jeanologia laser  
Proton laser applications  
Iberdrola

## Colaboración

Valeo  
Next  
Deneb  
ICMM  
ICMA

## En proceso

Tecnoatom  
Cerámicas  
Escuelas Odontológicas  
Patrimonio restauración





**“Know-How”**

**Sinergias**

**Aportaciones**

**Marco de trabajo**

**Láseres de fs y  
amplificadores**

**Identificar necesidades y  
sinergias con centros y  
empresas**

**Equipamiento  
técnico**

**Recursos  
humanos**

**Análisis de  
aplicaciones láser**

**Desarrollo de  
sistemas láser**

**Consultoría y  
formación**