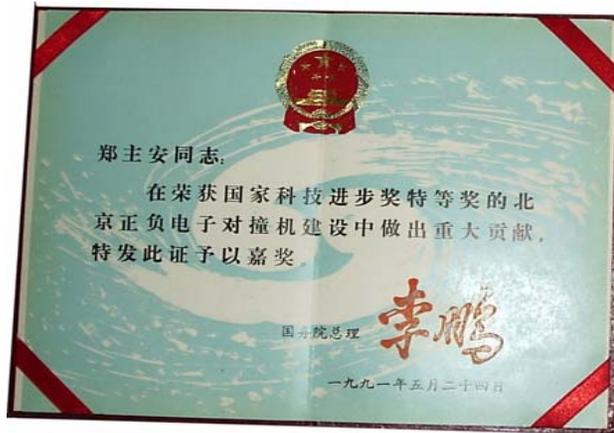


Vacuum Components Development for Light Sources

Dr. Guo Panlin
JJJvac, Shanghai
2012-10-15

- ◆ In 1980, the first ultra-high vacuum system for NSRL (Hefei) was developed by the founder of JJJvac.
- ◆ Since then, lots of SIP/TSP and vacuum systems were provided for Chinese national key facilities.
- ◆ Due to the contribution of high quality products and good service, JJJvac won the certificate issued by the State Council of China and Shanghai.



Until now, most of the vacuum pumps such as SIP,TSP and (SIP+NEG) for Light Sources and accelerators in China are provided by JJJvac.

SIP

Ultimate pressure $< 5 \times 10^{-9} \text{Pa}$

Bakeout: 48@200°C

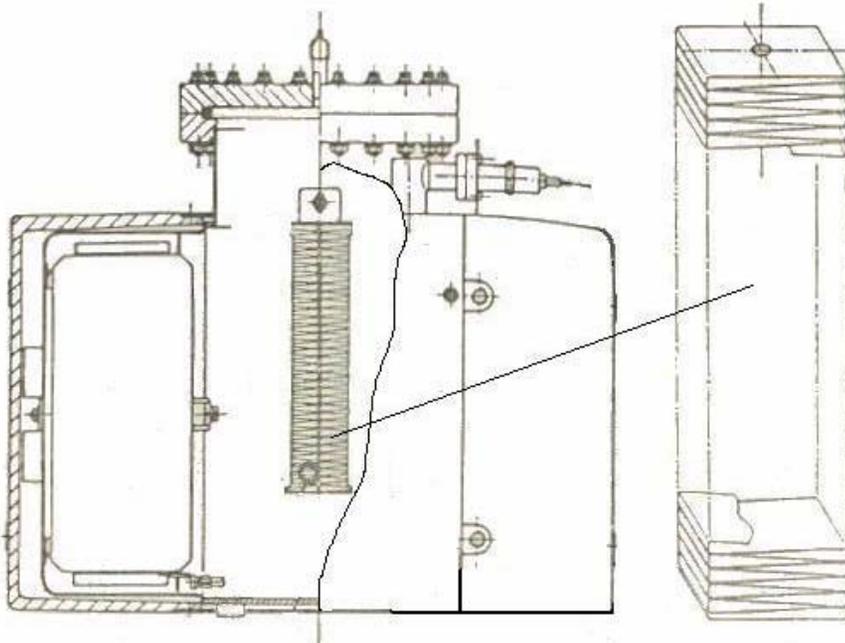
Measurement: Varian B-A gauge



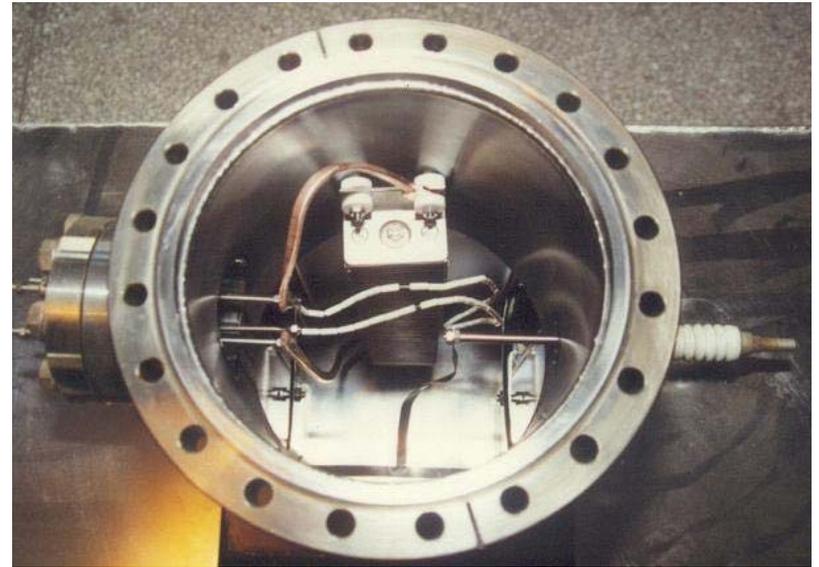
SIP combined with TSP create ultra-high vacuum about $10^{-9}\sim 10^{-10}$ Pa.



The combination of SIP and NEG can produce ultra-high vacuum about 10^{-10} Pa

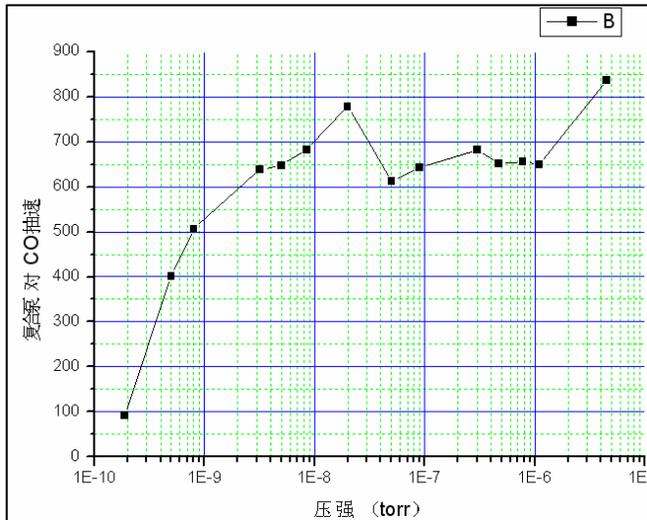
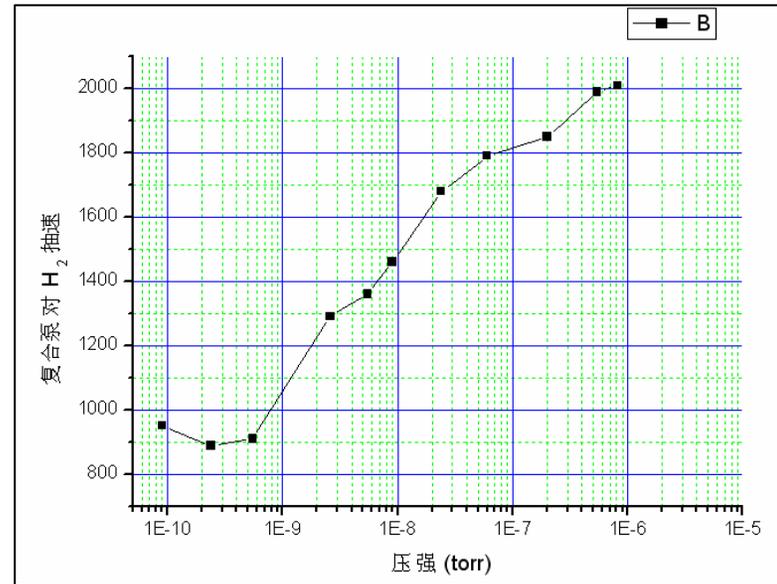
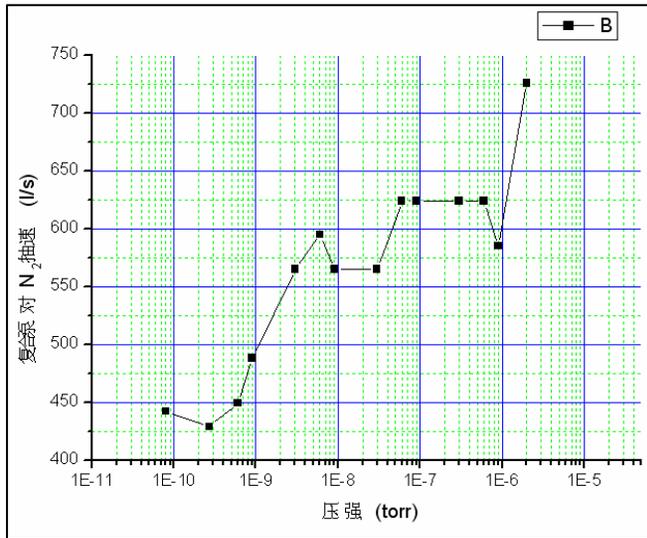


SASE NEG



Pumping speed of (SIP+NEG)

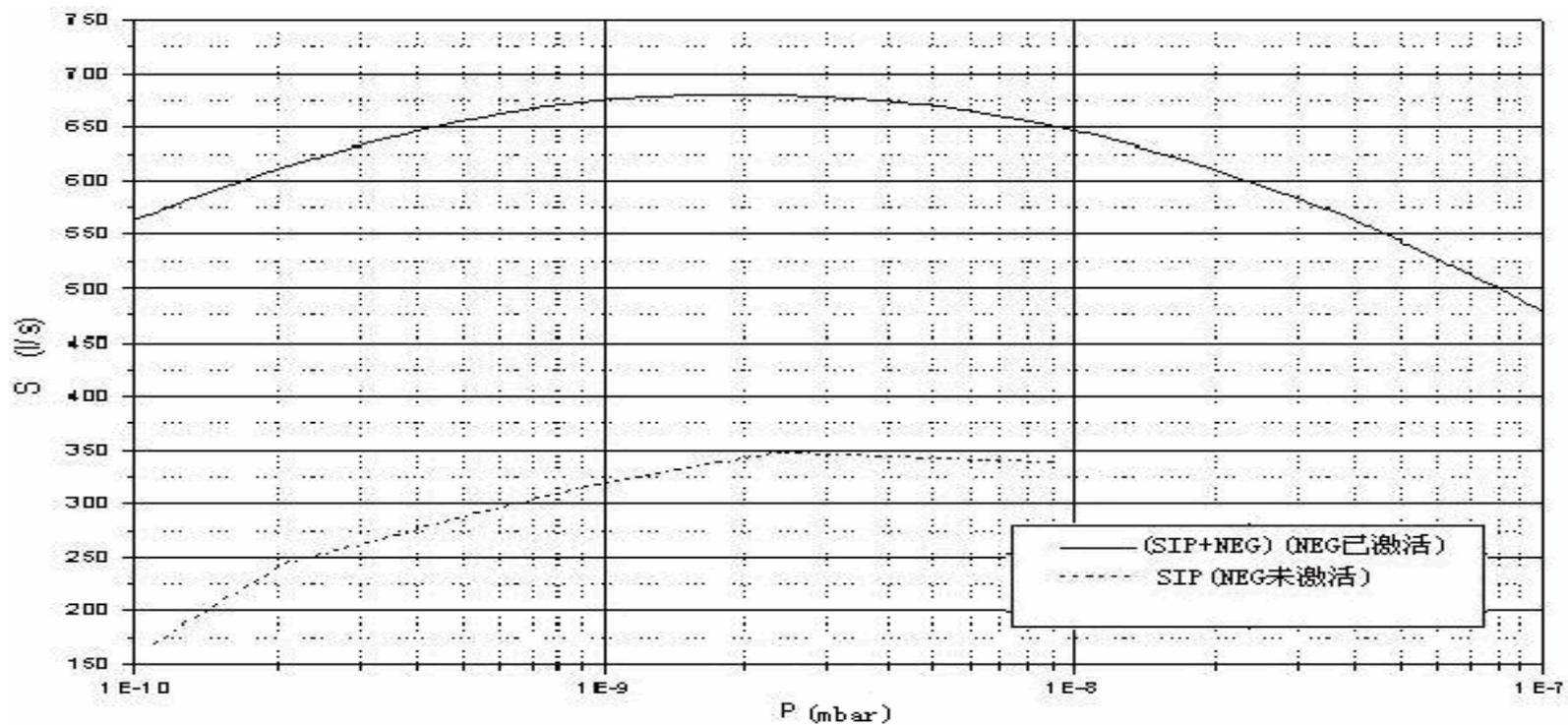
(from SSRF, 200 l/s SIP+NEG)



Result:

The pumping speed is about 450l/s for N₂ in 1~9E-10torr region, while for H₂, it is 900~1000l/s. But for CO, the pumping speed decrease from 500l/s to 100l/s.

Experiment shows that SIP+NEG still has large pumping speed even at very low pressure. The combination of SIP and NEG is very useful to pump out the residual gas-H₂.



Besides pumps, JJJvac also supplies other vacuum components or systems for Light Sources and accelerators.

2005~2009, manufacture, installation and debugging of the vacuum system for SSRF storage ring including:400m SS chamber, SIPs,TSPs,and (SIP+NEG)。



316LN SS chamber of SSRF

**QM/SM
chamber**



**QM/SM
chamber
with SR
branch**



**BM
chamber**



Activities of Chamber Manufacture



Deep-draw die
Press machine



Automatic TIG welding
Rotatable platform



Connecting the
longer segments

Demagnetization and degass of vacuum chambers (Magnetic permeability <1.03 after annealing)



Vacuum anneal furnace

(Size: $\Phi 800\text{mm} \times 3500\text{mm}$, Loading weight: 2000Kg, Temperature: 950°C ,
Temperature difference $\pm 10^{\circ}\text{C}$, From 850°C to 600°C @ 15Min, $\mu \leq 1.03$)

Table 1. Practical tolerance of chamber

Flatness	Linearity	Direction angle of absorber	Bend angle
<0.5mm/3m	<1mm/3m	<0.9mrad	<1.4mrad

Table 2. Installing position tolerance of cham./Ab/BPM

	X (mm)	Y (mm)	Z (mm)
Chambers	± 2	± 1	± 1
Absorbers	± 1.5	± 0.2	± 2
Normal BPM	± 1	± 1	± 1
High position BPM	± 0.5	± 0.5	± 0.5

The first In-Vacuum Undulator for SSRF in 2009. Vacuum system, magnet supporter and RF shielding were made by JJJvac. In 2010, similar vacuum components were made for Krea Light Source.





Fast Valve, <math><10\text{mS}</math>

Front ends of beam line for BEPC2 of IHEP

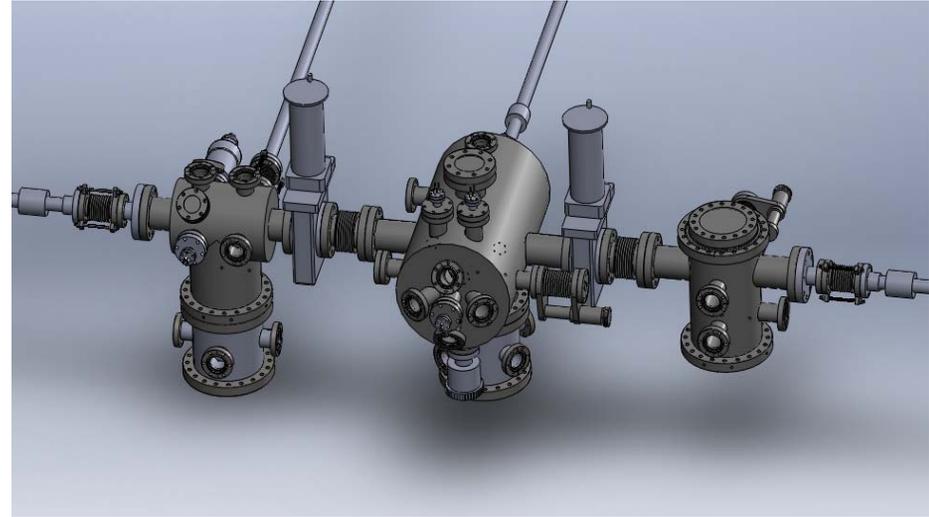
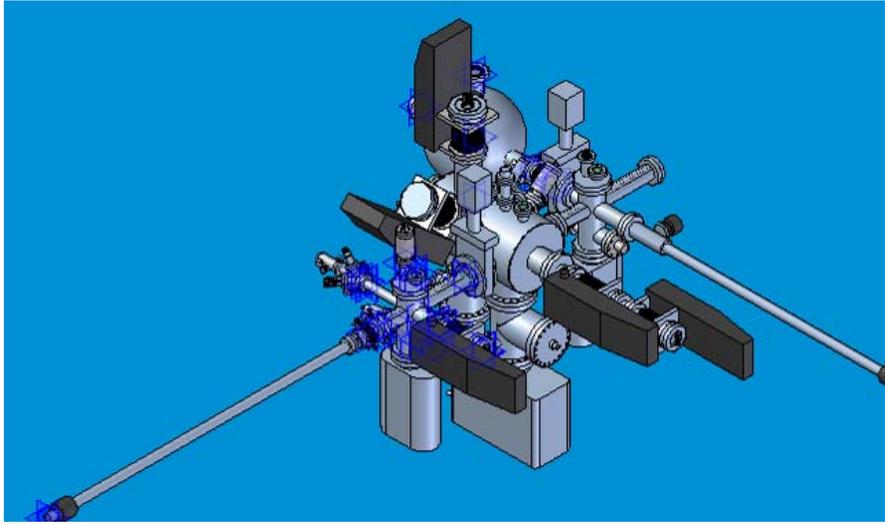
**2011~2012, a new vacuum system for NSRL
Light Source (Hefei), including SS storage ring
chambers, absorbers, SIPs, and (SIP+NEG)s**

Heat Load Measurement System

(2012 International Cooperation Project of SSRF and LBNL)



Photocathode fabrication system for SSRF and BEPC2



- ◆ Photocathode transport in vacuum environment
- ◆ Surface clean
- ◆ Photocathode fabrication and activation
- ◆ Quantum efficiency measurement
- ◆ Vacuum: $10^{-8}\text{Pa} \sim 10^{-10}\text{Pa}$

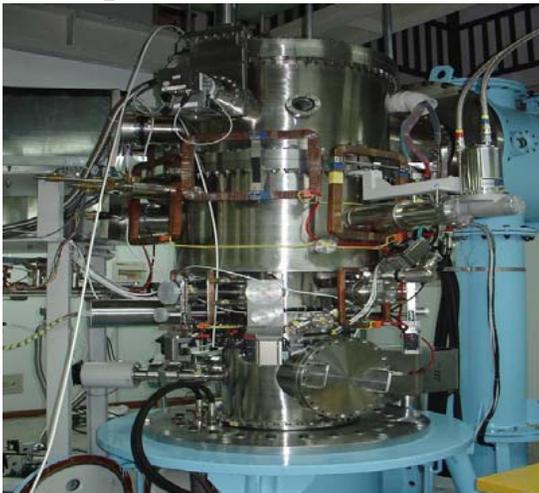
Other components or systems for Scientific Research



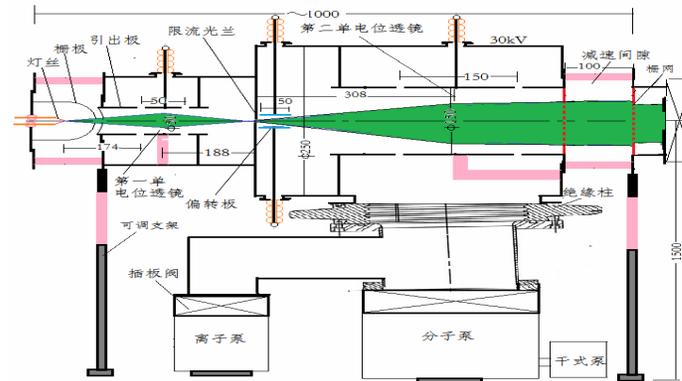
Spatial Filters for SIOM



X-ray image device for NAOC

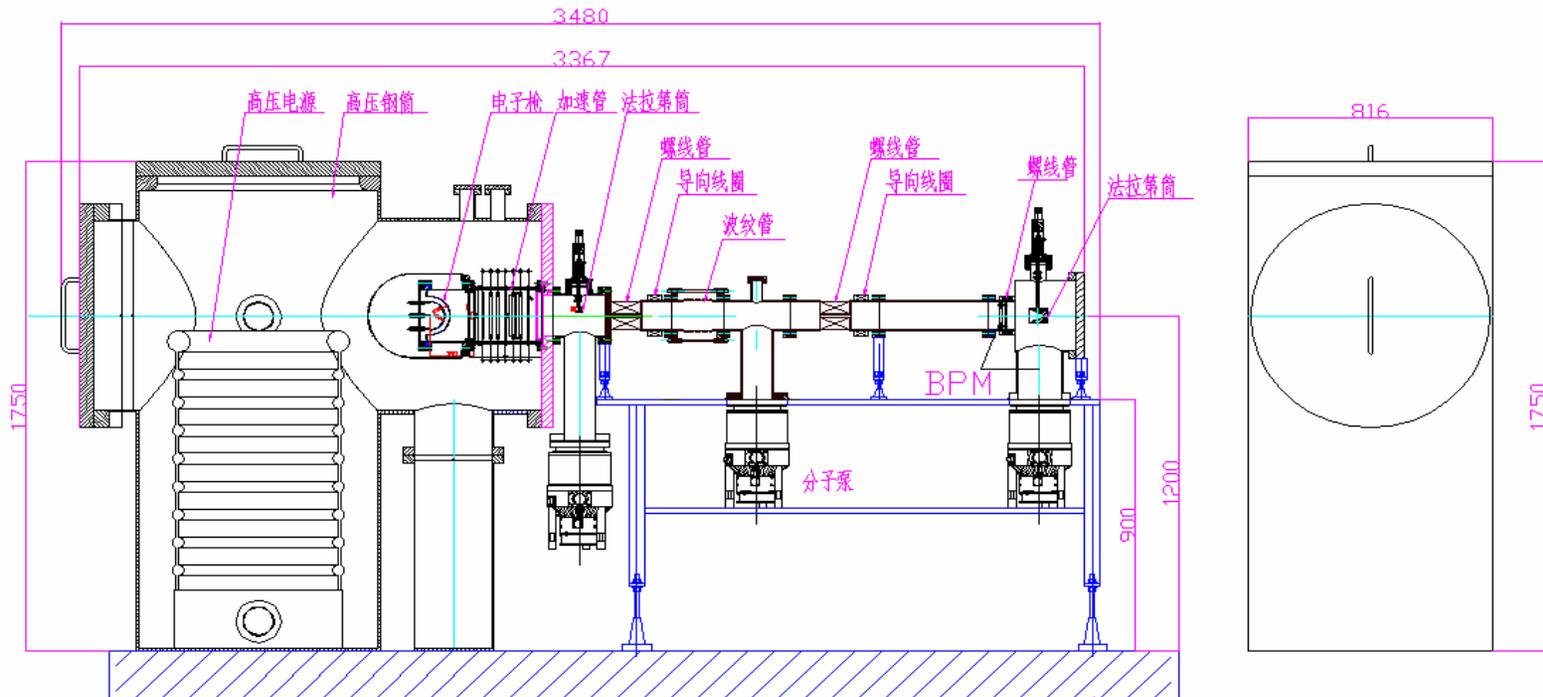


Shanghai-EBIT for Fudan



Electron source (nA-pA) for NSSC

Extreme low current accelerator for NSSC



Energy:30-250keV

Current:nA-pA

Other products of JJJvac



**Vacuum
Furnaces**



Turbo Molecular Pumps



Valves

In the company, a group of experienced engineers are devoted to the design and manufacture of vacuum components and systems.

We specialize in vacuum challenges together with the users.

Thank you !