

Status of the Pellet Target development

June-December 2013

M.Büscher, A.Gerasimov, V.Chernetsky, P.Fedorets, A.Dolgolenko, V.Balanutsa,
L.Gusev, S. Mineev, S.Podchasky, D.Spölgen , I.Tarasenko

Main activities

2 places of activities:

- Tests with the first pellet target version in IKP.
- Development of a new target version in ITEP.

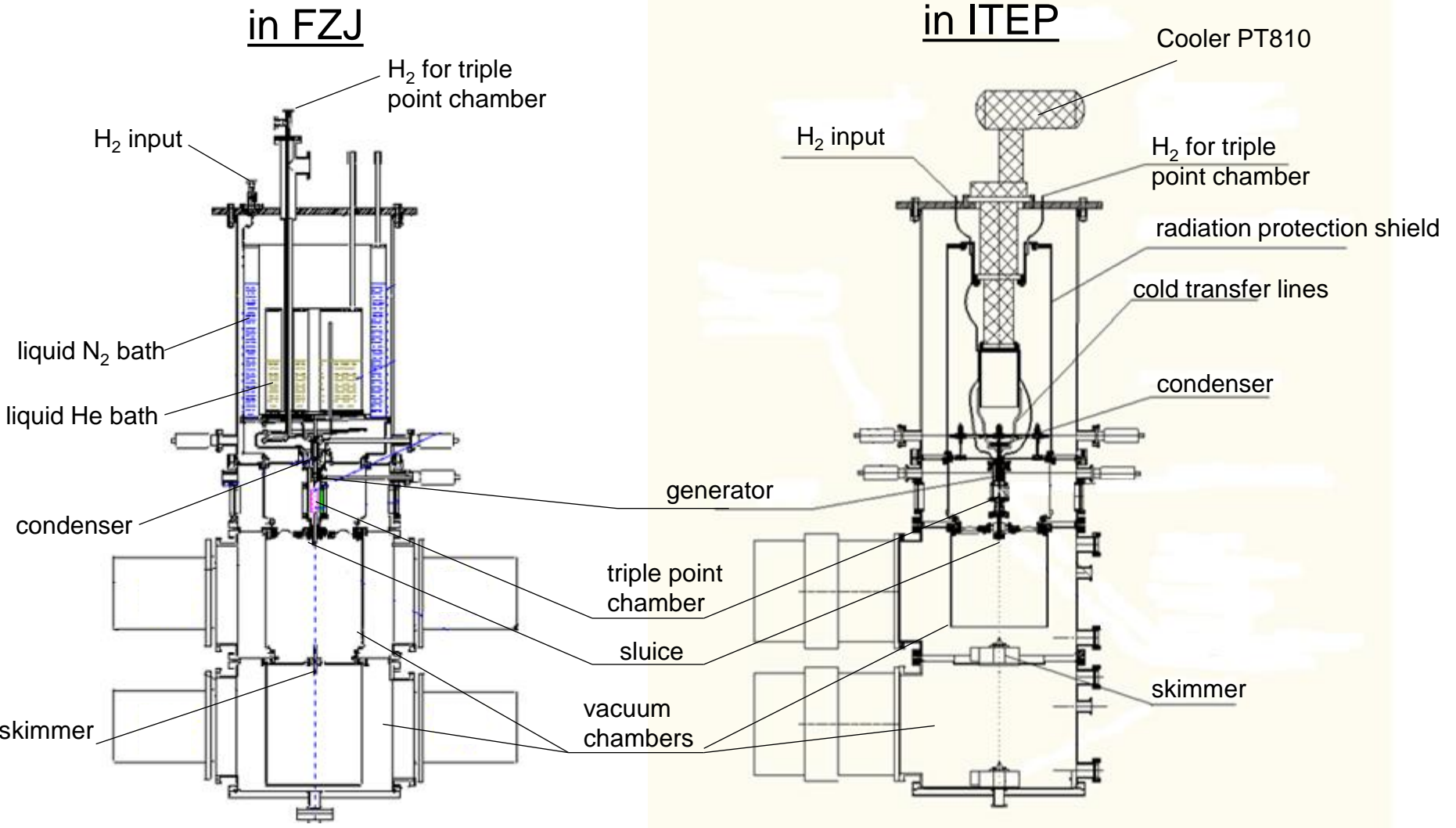
List of main current tasks:

- 1) Full assembling and put into operation the another version of the target in ITEP.
- 2) Improvement of the nozzle design and technology of its production.
- 3) Test and commissioning of the adjustment system
- 4) Methods and constructions for production of extra thin jets and droplets ($\varnothing \leq 15 \mu\text{m}$).

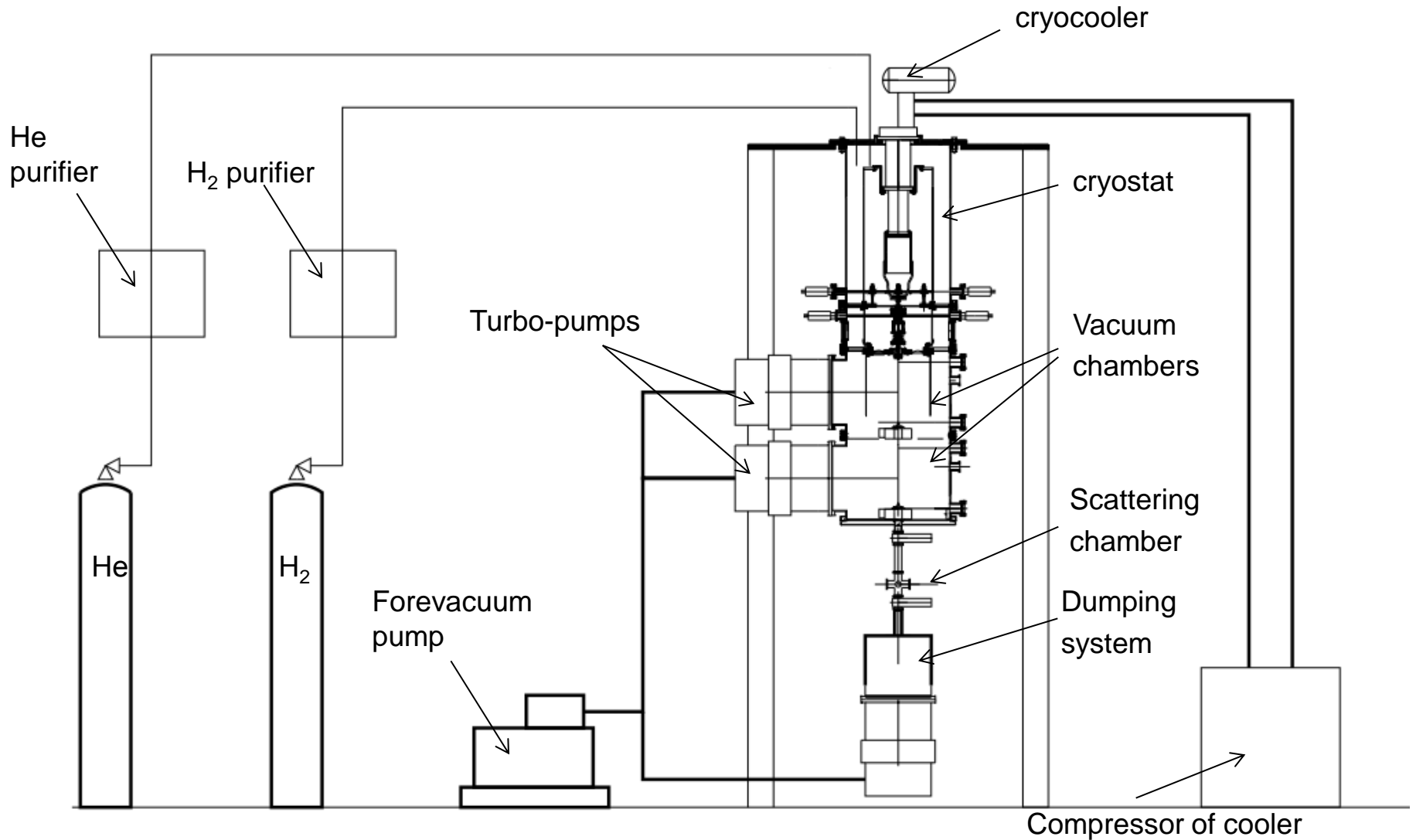
Why new version of the target?

1. Restricted time of operation due to the small volume of the liquid He bath. Regular refill of liquid He is needed. It may follow to the disturbance of the temperature regime.
2. New type (vibrationless cryocooler) is available. Advantages – easier maintenance and operation, long time operation possibility, reduction of the operating costs (do not use liquid N₂ and He).
3. The idea is to keep the same main construction and dimensions, but exchange only the cryogenic cooling system.

First and second versions of the pellet target



Scheme of another version of the target



Test place in Moscow

Test hall, April 2013, after renovation



Renovation of the test hall, November 2012 - April 2013

Test place in Moscow, November 2013



Status at November 2013:

- 1) Cryostat is assembled
- 2) Cryocooler is installed in the cryostat
- 3) Search for leaks is started



Timelines for the test place in Moscow

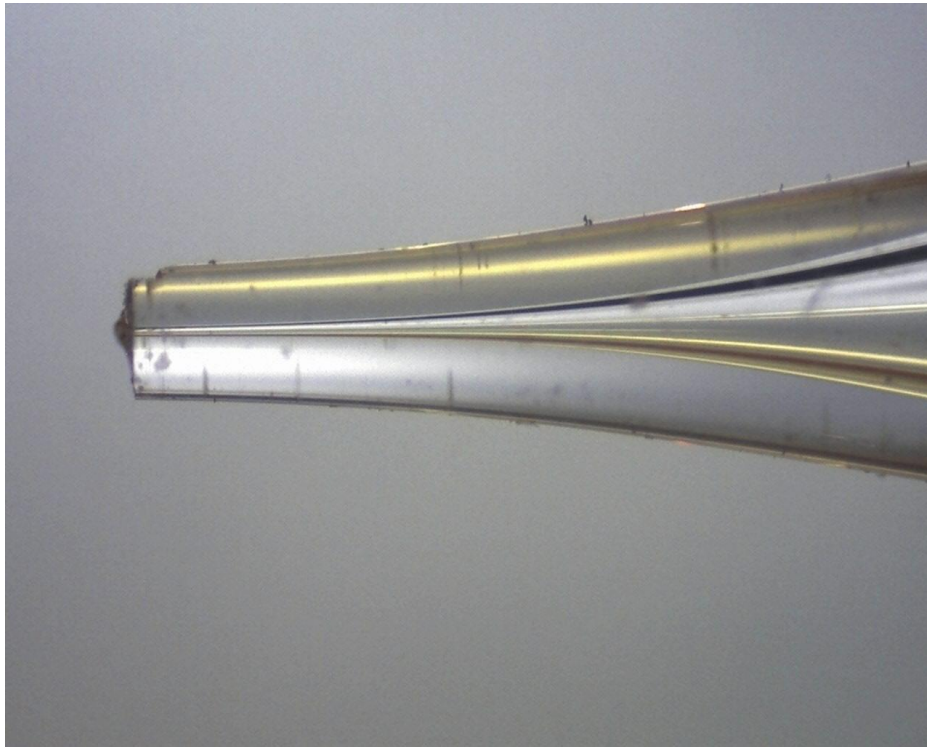
	2013				2014			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Purchase of the equipment and manufacture details of target								
Assembling of the target								
Vacuum test								
Cold test								

1. Preparation of the new test place for the pellet target in ITEP is finished.
2. List of orders for equipment was prepared and purchase is going on.
3. Drawings for the internal parts are prepared in designer department of ITEP.
4. Production of the internal parts is going on in the workshop of ITEP.
5. Assembling and vacuum tests are going on.

Problem of the nozzle blocking

typical photo (June 2012, as example)

before test



after test

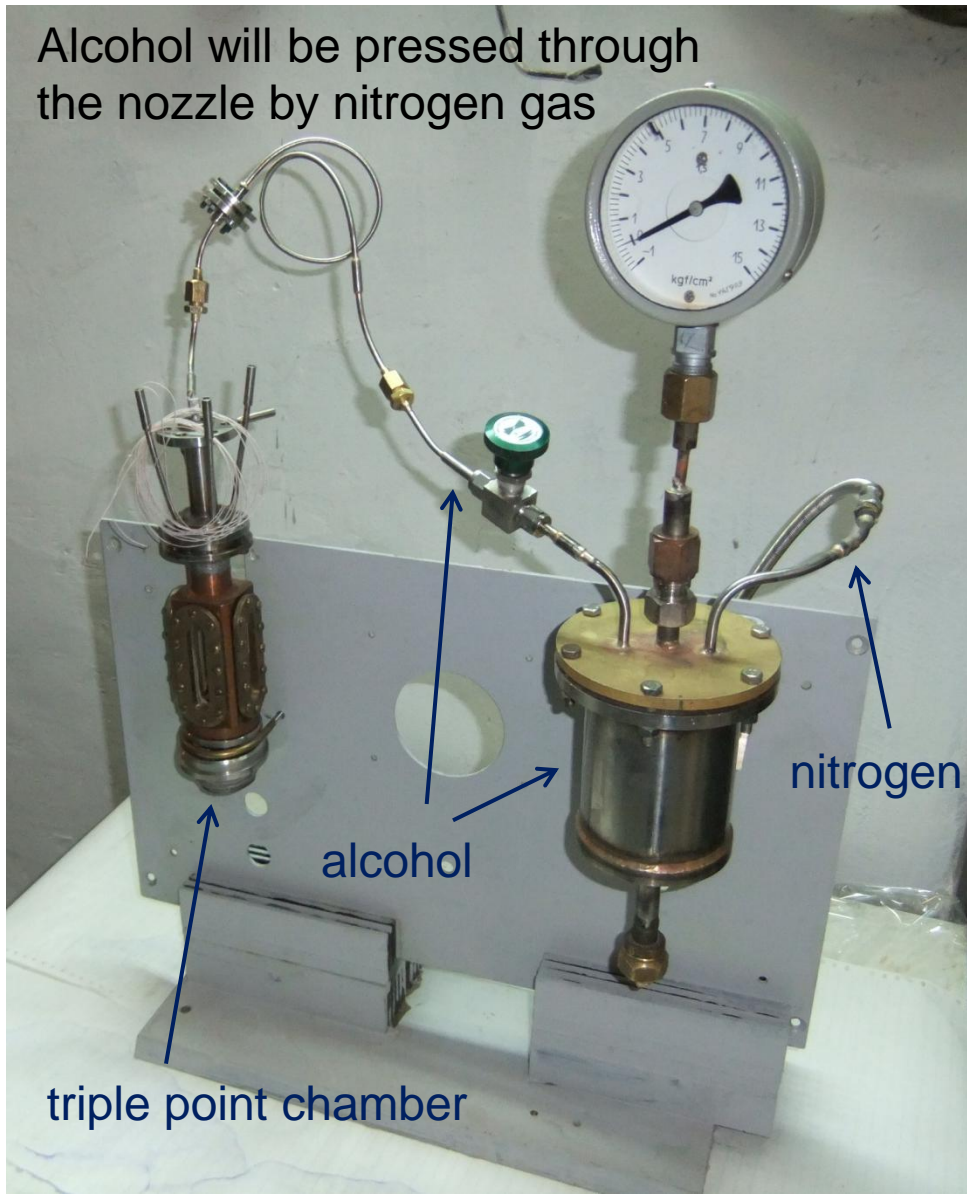


- investigation of glues and technologies for cryogenic usage
- meetings and discussions with colleagues from Frankfurt University
- preliminary tests of nozzles before installation for cryogenic tests

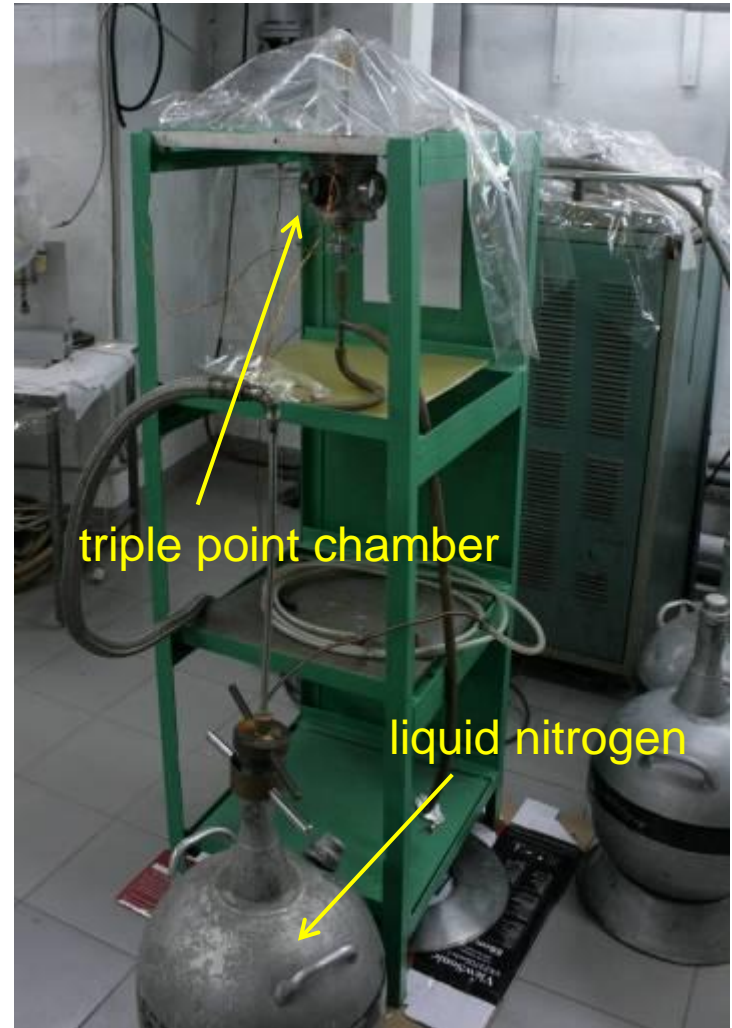
Test of nozzles in Moscow

Test station with distilled water or alcohol

Alcohol will be pressed through the nozzle by nitrogen gas



Second setup for pressing liquid N_2 through the nozzle is under development

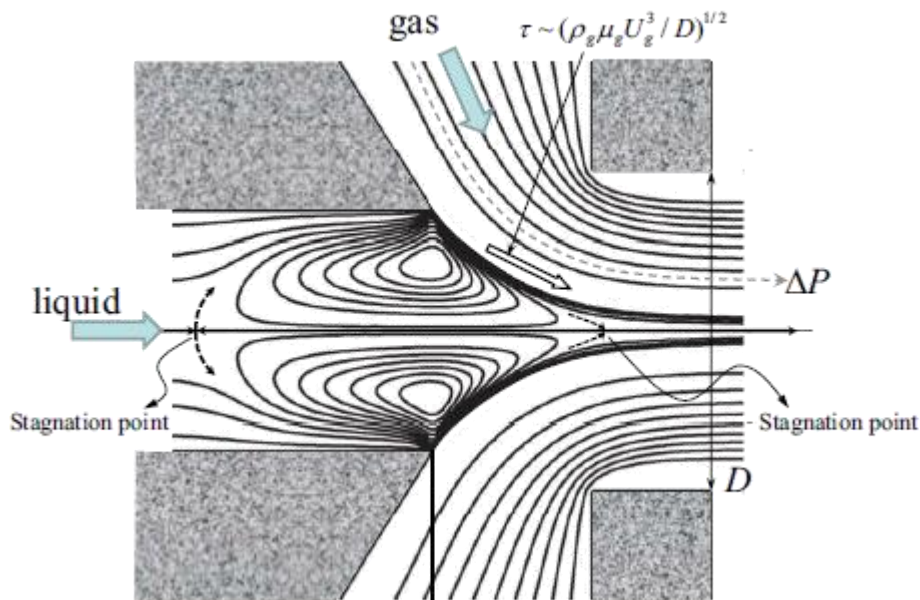


Idea of the nozzle blowing

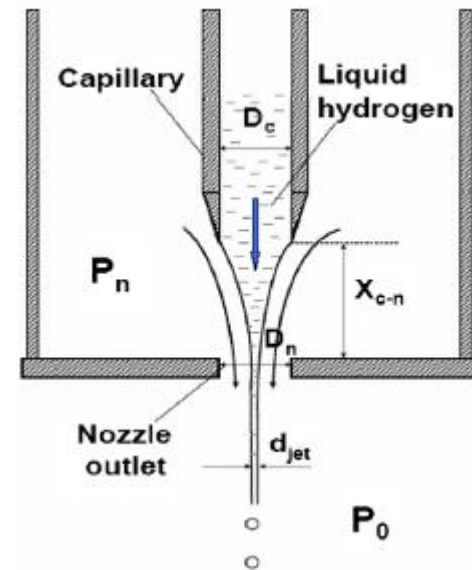
With help of the focussing gas flow reduce the jet diameter

Advantage: possibility to use bigger nozzle diameters with less probability of blocking

Goal: production of droplets with diameters $< 10 \mu\text{m}$



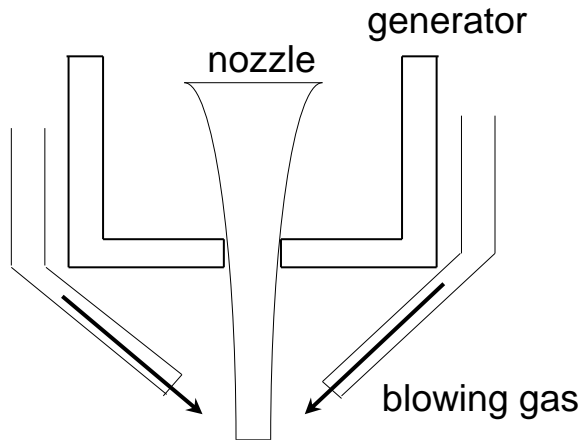
A. M. Gañán-Calvo,
PRE 79, 066305
(2009)



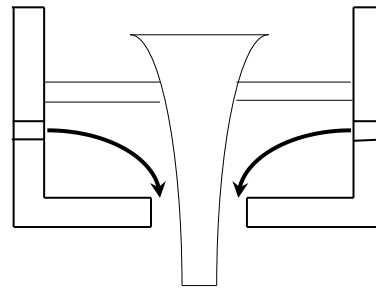
V.Varentsov,
NIM A 646, 12 (2011)

Overview of developing nozzle blowing method

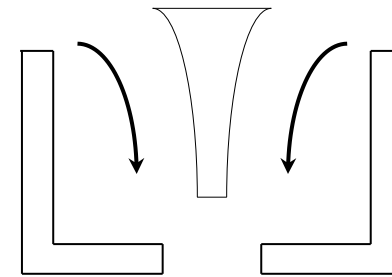
Generator type N2,
June 2012



Generator type N3,
December 2012



Generator type N4,
April 2013



Generator type N4:

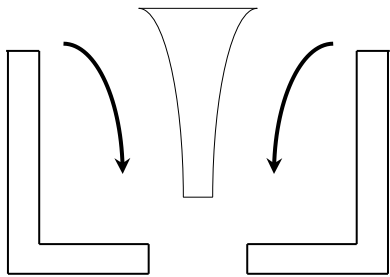
Geometry of blowing as recommended in:

A. M. Gañán-Calvo,
PRE 79, 066305 (2009)

Tests with nozzle blowing method in IKP

Universal generator type N4 (April 2013) for standard or blowing methods

Generator type N4,
April 2013

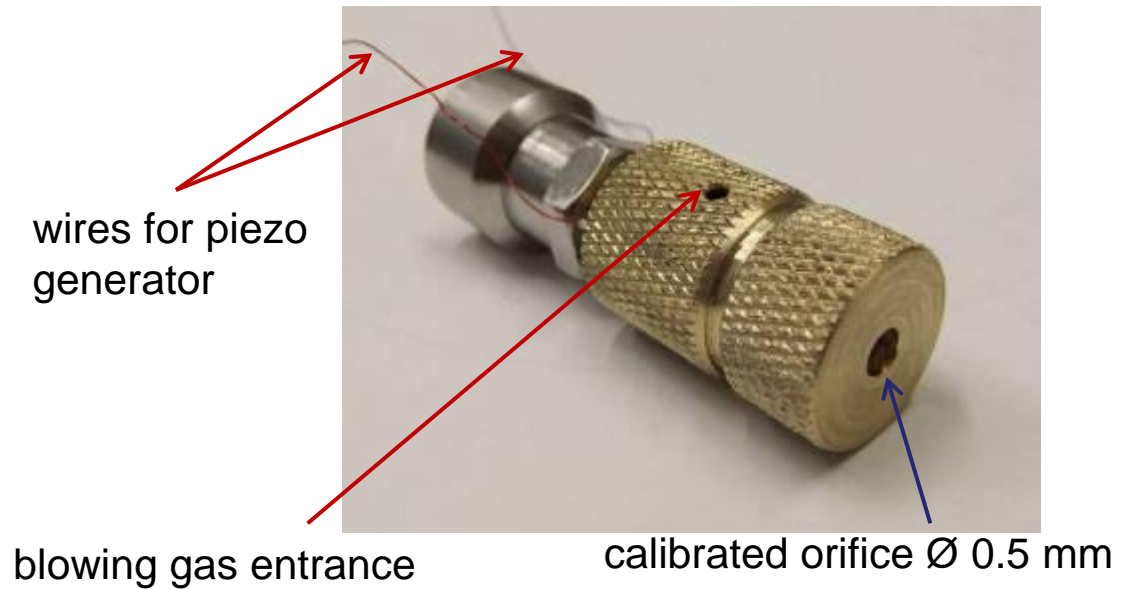


Generator type N4:

Geometry of blowing as
recommended in:

A. M. Gañán-Calvo,
PRE 79, 066305 (2009)

Generator type N4, April 2013



Tasks and Timelines for work at IKP

In order to cover the time gap before operation of the test station in ITEP following works are planned in IKP:

- 1) Tests of the nozzles with hydrogen jets
- 2) Methods and constructions for production of extra thin jets and droplets ($\varnothing \leq 15 \mu\text{m}$). Experimental studies. Requested by PANDA.
- 3) Measurements: requested by PANDA
 - a) pellet beam properties
 - b) pressure distributions

Totally planed 2-3 tests in 2014