Meeting @ GSI, 29/10/09

E.B., 16/11/09

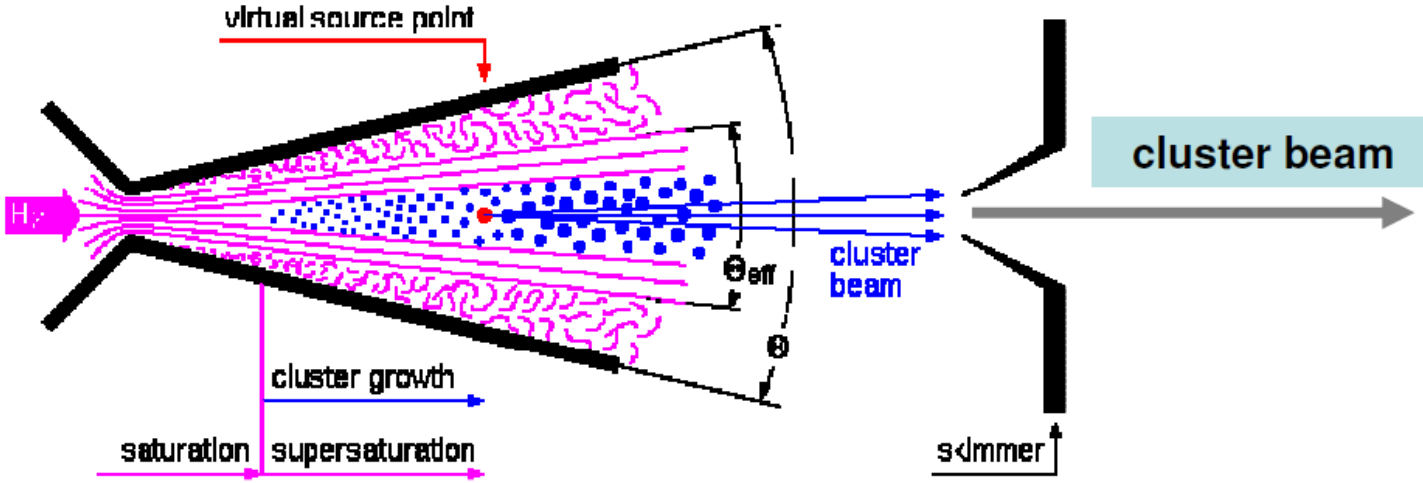
AGENDA CERN-GSI Meeting on internal targets and beam cooling in storage rings 29th of October 2009 GSI Darmstadt, Germany		
9.00	**Welcome**	C. Dimopoulou, GSI
9.05	Production storage ring for radioactive ions	E.Benedetto, CERN & NTU-Athens
9.30	Discussion	
9.45	Ion storage rings at GSI and FAIR; The ESR internal gas-jet target	C. Dimopoulou, U. Popp, GSI
10.10	The ESR internal microdroplet target	N. Petridis, R. Grisenti, University of Frankfurt
10.35	Modeling and simulation tools of beam-target interaction	O. Boine-Frankenheim, GSI
11.00	**Coffee break**	
11.15	Development of dense targets for PANDA at FAIR	A. Khoukaz , University of Münster
11.40	Operation of the internal pellet target at COSY	A. Khoukaz , University of Münster
11.55	Experiments at COSY with pellet target, stochastic cooling and RF	H. Stockhorst, FZ Jülich
12.15	Discussion	
13.00	**Lunch break**	
14.00	Discussion	

Partecipants: E. Benedetto (NTU-Athens and CERN), O. Boine-Frankenheim (GSI), C. Dimopoulou (GSI), G. Franchetti (GSI), V.Gostischev (GSI), R. Grisenti (University of Frankfurt), C. Hansen (CERN), A.Kalinin (University of Frankfurt), A. Khoukaz (University of Münster), A. Lehrach (FZ Jülich), H. Orth (GSI), N. Petridis (University of Frankfurt), U. Popp (GSI), H. Stockhorst (FZ Jülich), E. Wildner (CERN).

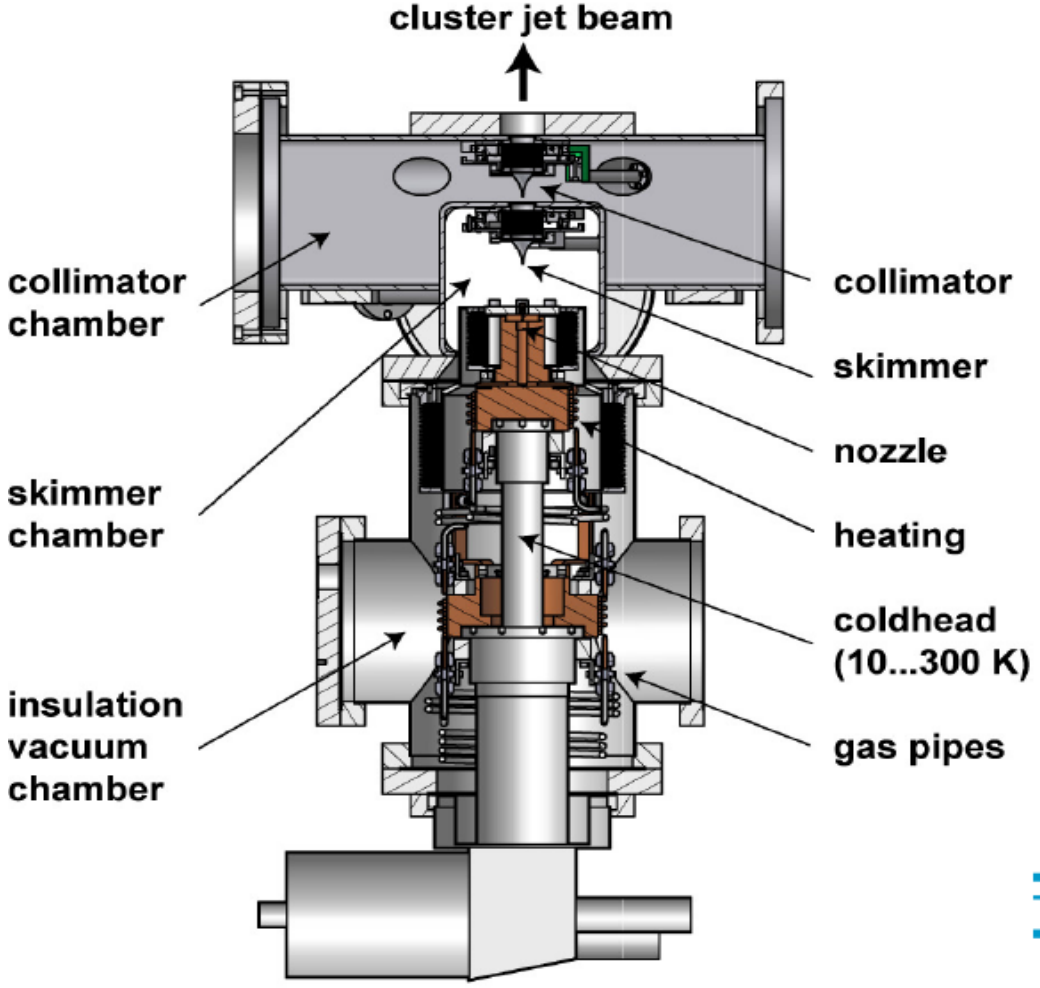
Summary is here

Production of Cluster-Jet Beams

- Preparation of a cluster-jet beam by a set of two skimmers behind the nozzle
- Constant opening angle of the cluster-jet after the second skimmer

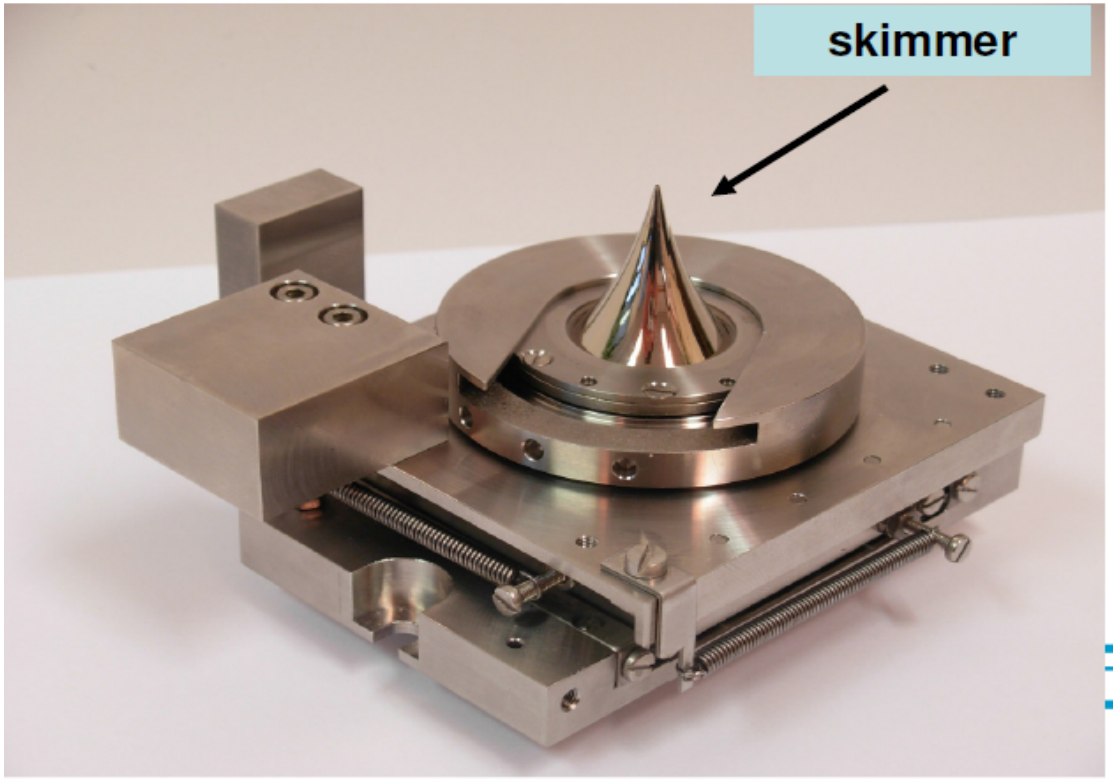


Münster: The PANDA Cluster-Source Prototype



Cluster Beam Adjustment

- Adjustment of the target beam during beam operation by a set of movable skimmers

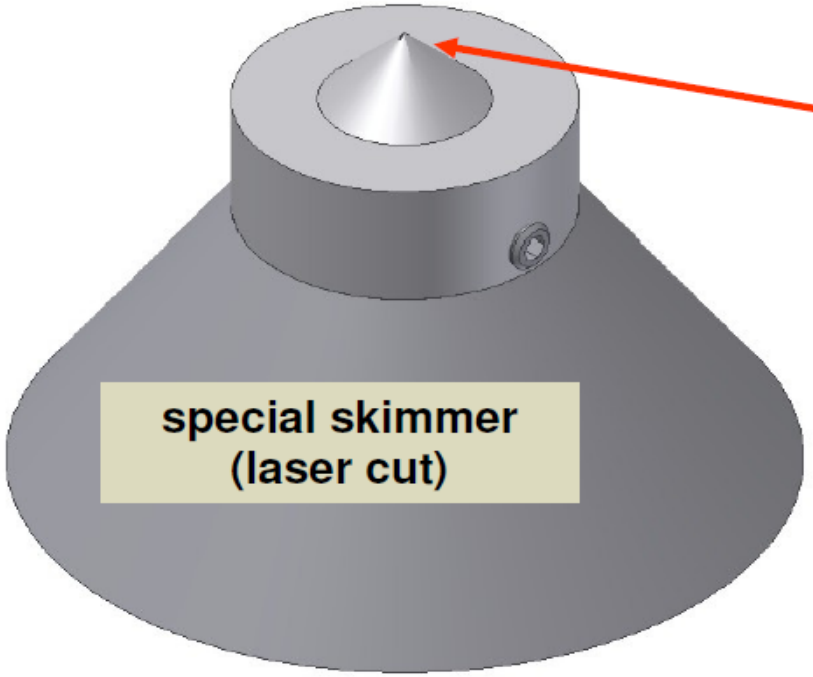


used for adjustment of the cluster-jet after installation

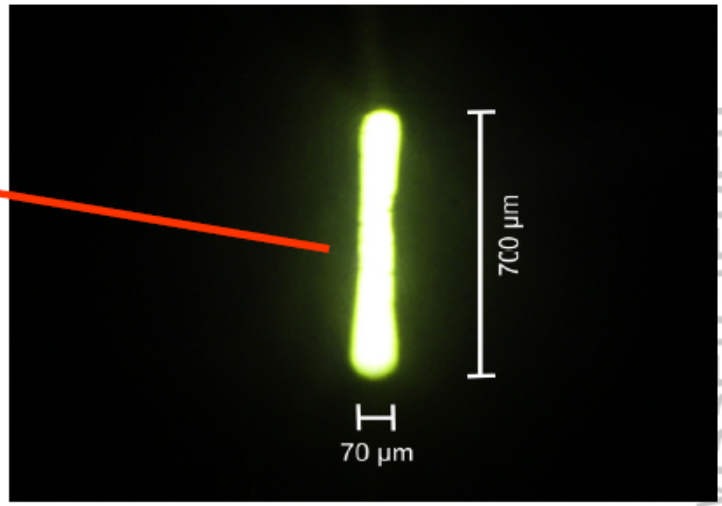
A. Koukaz

Cluster Beam Density Distribution

- Cluster-Jet shape adjustable by skimmers
  → special beam geometries at the PANDA interaction point possible (e.g. 15 mm x 3 mm)



special skimmer (laser cut)



microscopic view of the skimmer opening

Westfälische Wilhelms-Universität Münster

Cluster Beam Densities (Status)

	CELSIUS	E835 FERMILAB	Genova/GSI	ANKE and COSY-11	Münster
nozzle diameter	100 µm	37 µm	26 µm	11-16 µm	11-28 µm
gas temperature	20-35 K	20-32 K	28-35 K	22-35 K	20-35 K
gas pressure	1,4 bar	<10 bar	10-20 bar	18 bar	>18 bar
distance from nozzle	0,32 m	0,26 m	0,26 m	0,65 m	2,1 m = PANDA geomety!
target density	$1{,}3\times10^{14}$ cm^{-2}	3×10^{14} cm^{-2}	$>1\times10^{15}$ cm^{-2}	$>>1\times10^{14}$ cm^{-2}	8×10^{14} cm^{-2}

even higher densities expected for the PANDA Cluster-Source Prototype

The present GSI accelerator complex

C. Dimopoulou

ion sources

Unilac

All ions from H to U

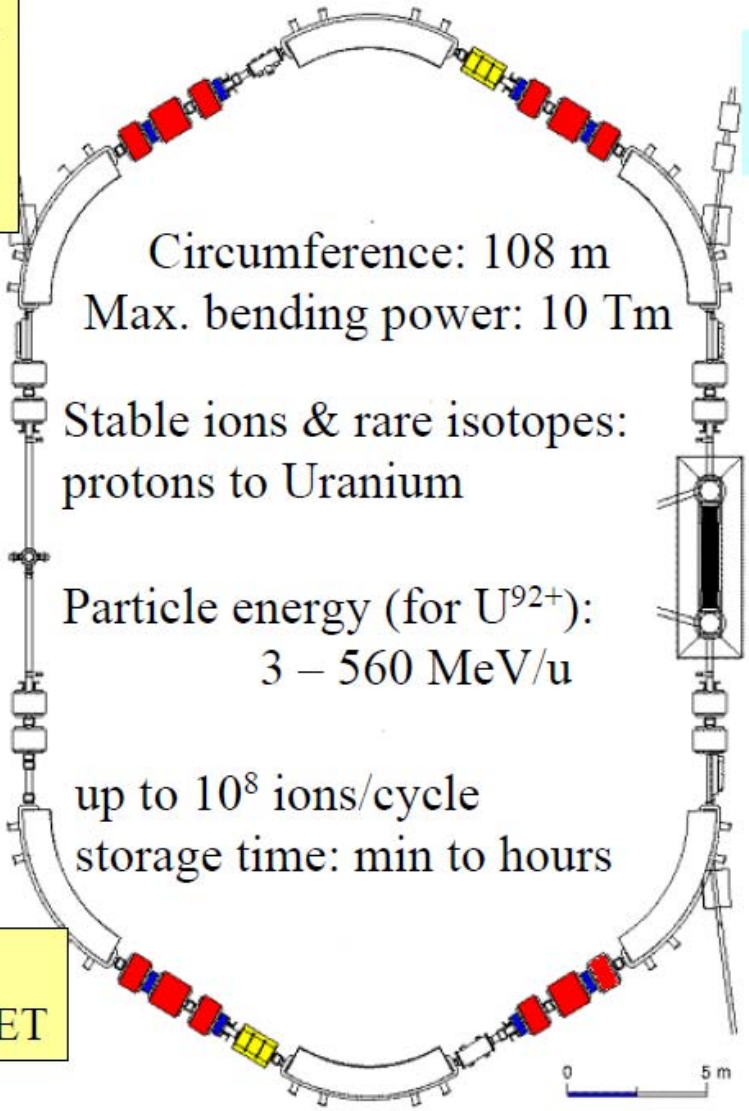
Parallel operation of 3-6 experiments

Tumor therapy

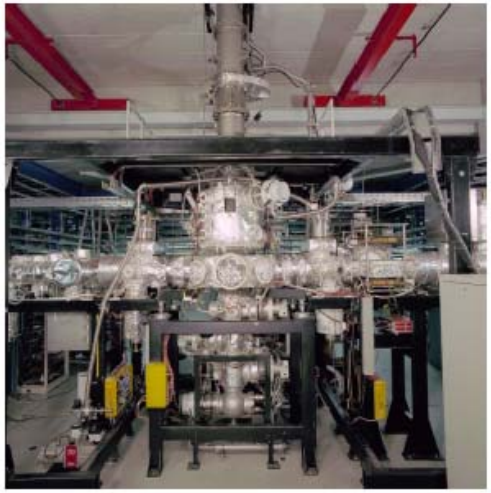
Experimental Storage Ring

C. Dimopoulou

STOCHASTIC COOLING
3 systems (H, V, Long.)
at 400 MeV/u (v=71% c)
Bandwidth=0.9-1.7 GHz



UHV: 10^{-12}-10^{-11} mbar
bakeable to 300°C

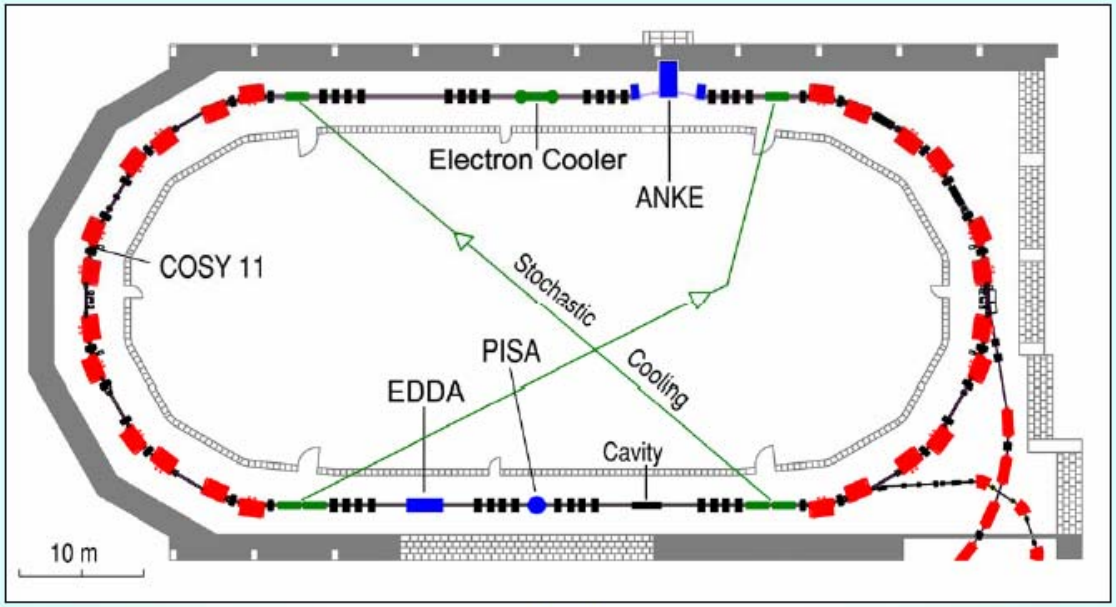


GAS JET/
MICRODROPLET TARGET

ELECTRON COOLER
up to 300 keV;
~10^6 electrons/cm^3 ;
0.1 T

COSY Accelerator Facility

old presentation on the web…



Ions: (pol. & unpol.) p and d

Momentum: 300 to 3650 MeV/c for p
540 to 3650 MeV/c for d

Targets:

- Internal: solid, cluster, atomic beam
- External: solid, liquid

Beam cooling:

- **Electron cooling** at injection (300 MeV/c)
  for beam accumulation
  high brilliance beams
- **Stochastic cooling** above 1.5 GeV/c for
  luminosity preservation