

# WASA Experimental Station

Internal Pellet Target

and

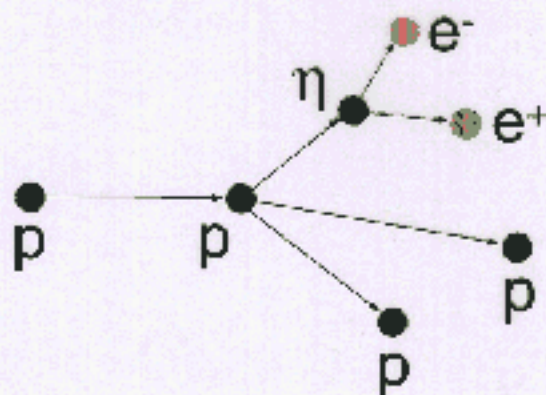
$4\pi$  Detector Setup

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<http://www.tsl.uu.se/wasa>

CERN, 4 February 1999

## WASA: physics goals

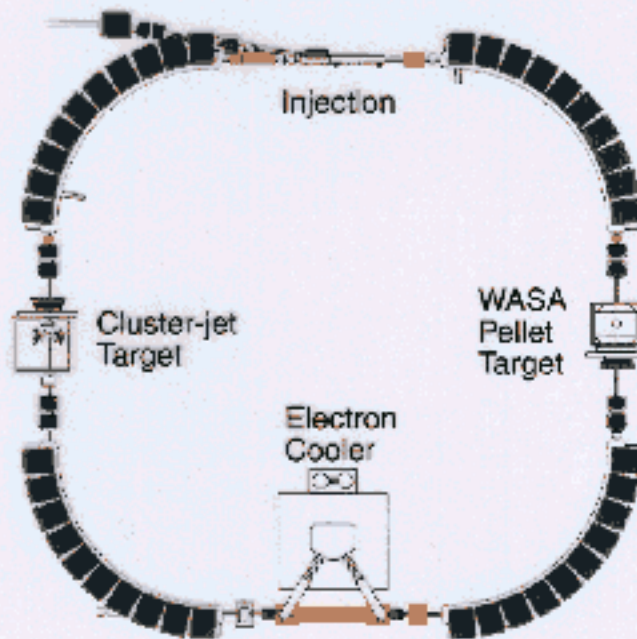


- $\pi^0$  and  $\eta$  production in  $pp$ - and  $pd$  collisions
- $\pi^0$  and  $\eta$  rare decays



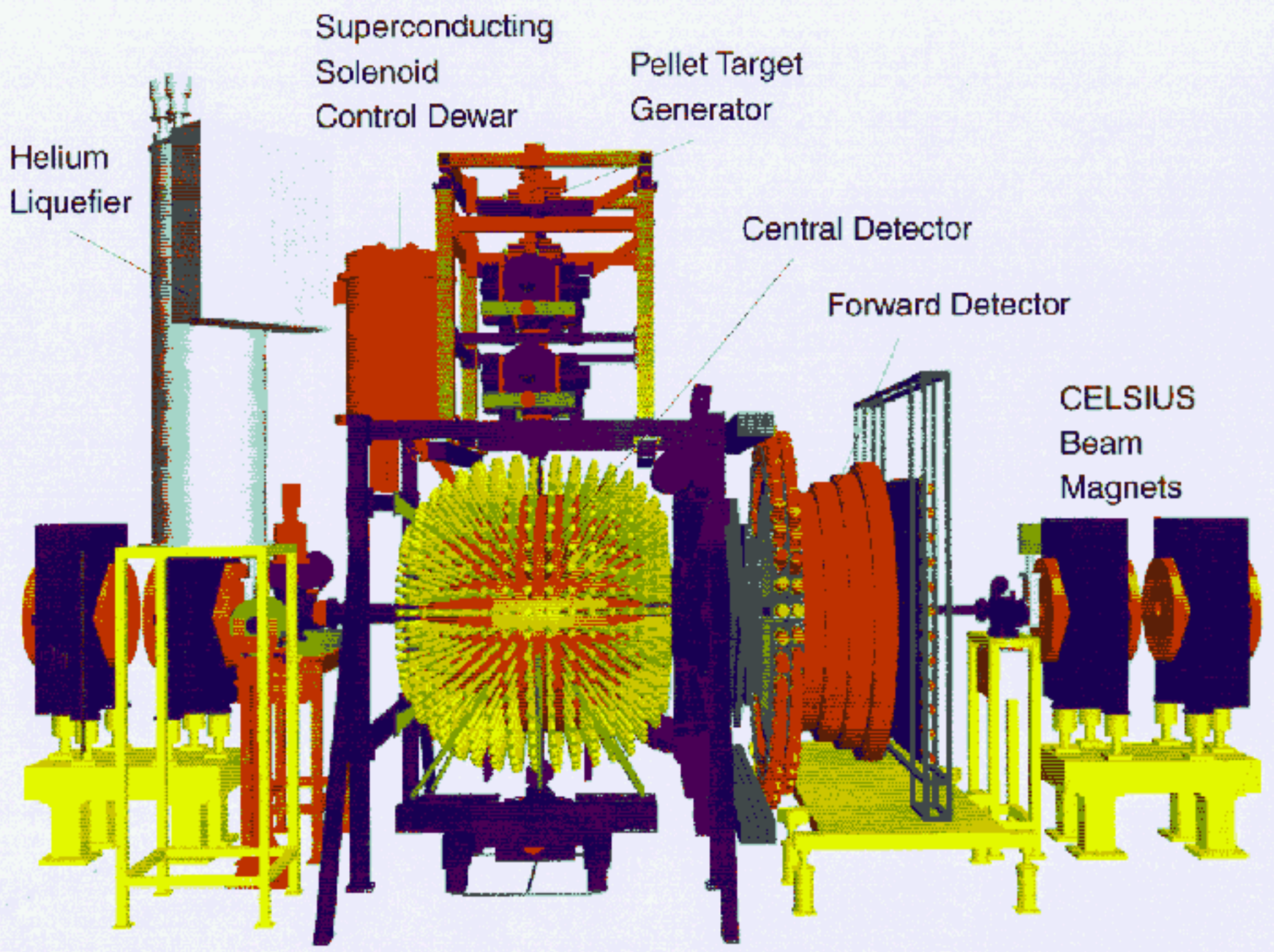
symmetry  
interaction  
form

## CELSIUS accelerator

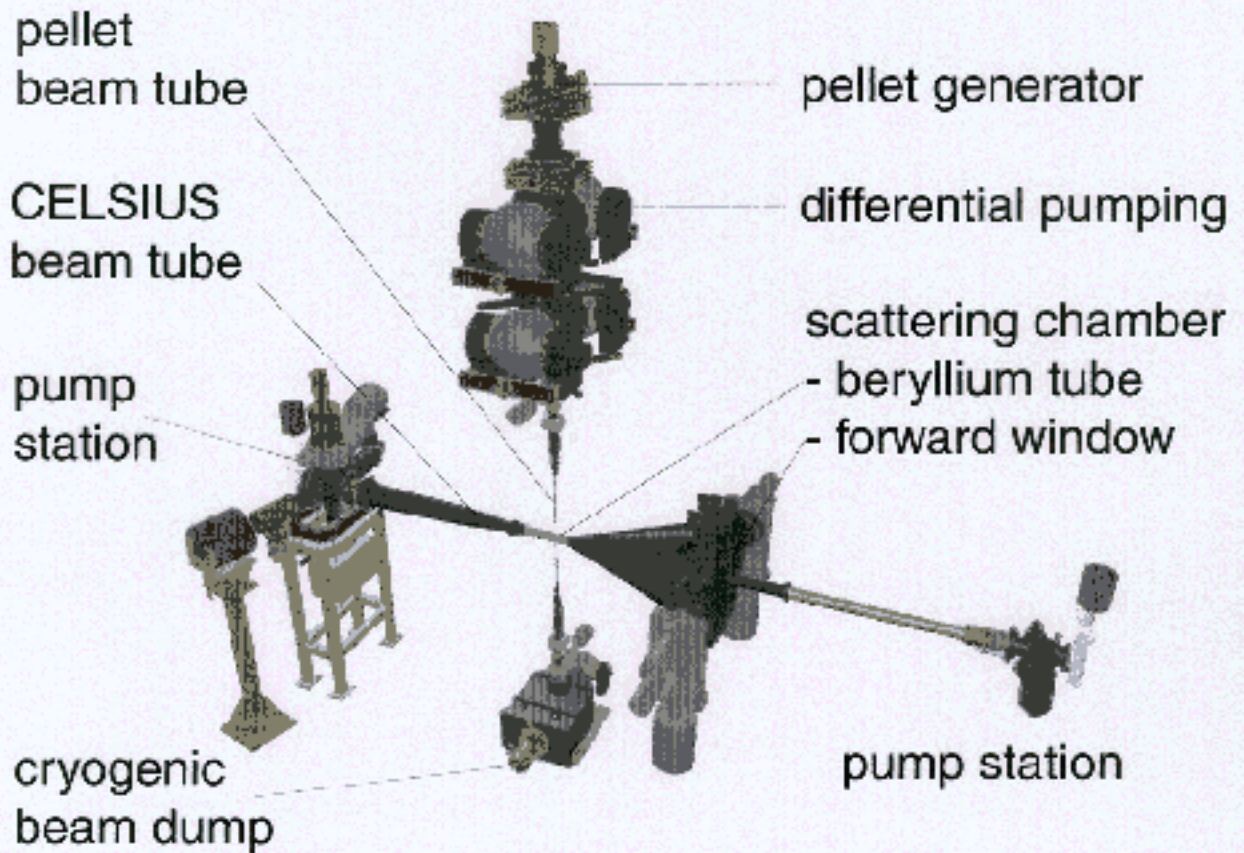


- Proton beam, max. energy 1.36 GeV
- High beam intensity:  $10^{10} - 10^{11}$   
Momentum spread  $2 \times 10^{-3}$ .  
Beam diameter  $< 5$  mm
- Electron cooling: 10 times improvement  
Max. energy proton beam 0.5 GeV
- Luminosity  $10^{32} \text{ cm}^{-2}\text{s}^{-1}$

# WASA 4 $\pi$ Detector Setup



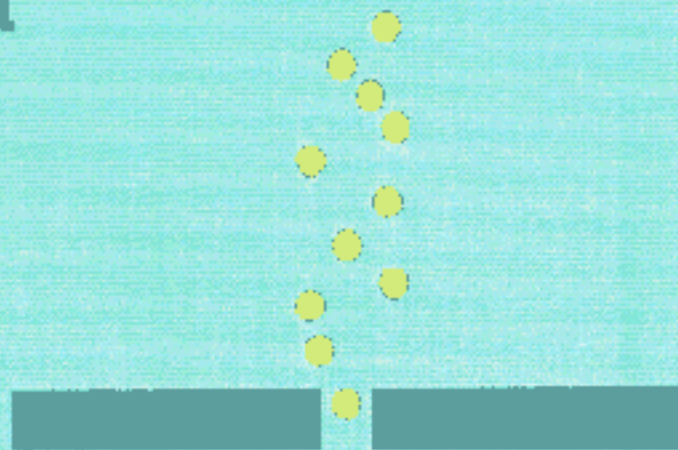
# Pellet Target System



- Hydrogen and deuterium
- Thickness  $\Phi = 30\mu\text{m}$  ( $10^{15}$ - $10^{16}$  atoms/cm<sup>2</sup>)  
(long beam lifetime)
- Pellet tube:  $\Phi = 5$  mm
- Beam tube:  $\Phi = 60$  mm,  $t = 1.2$  mm Be ( $0.0034X_0$ )
- Thin scattering chamber window  
0.42 mm stainless steel ( $0.24X_0$ )

# Pellet Target Principle of Operation

Pellet Target



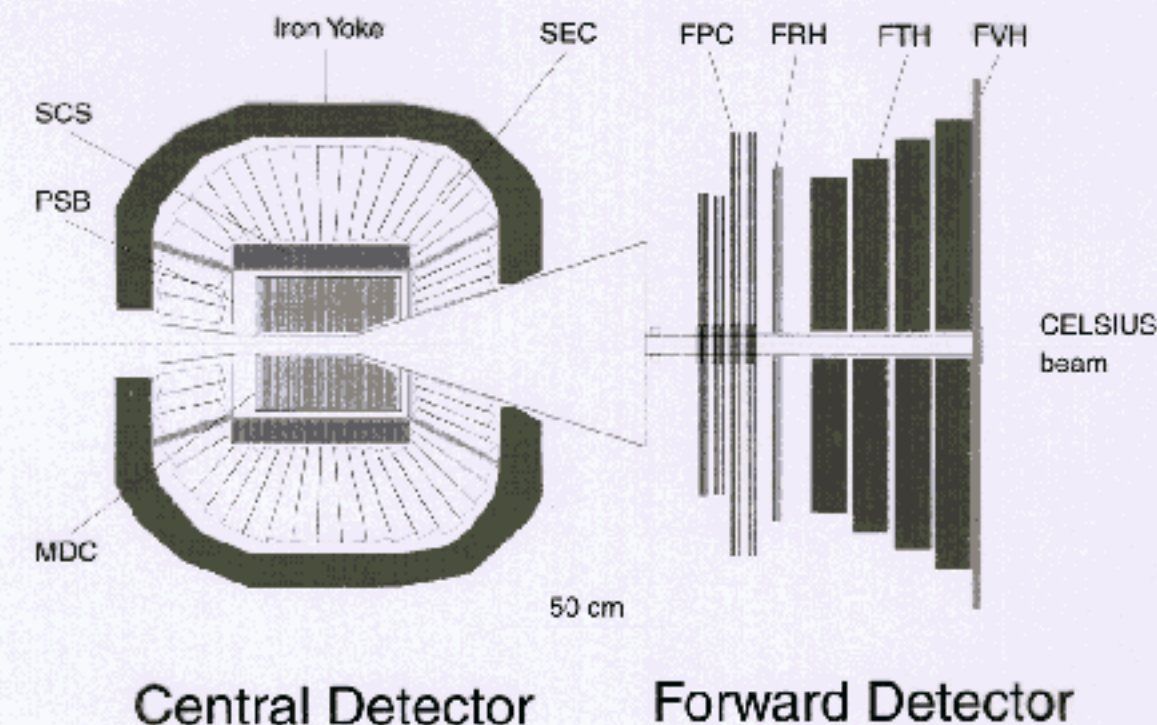
pellet stream  
 $f = 70 \text{ kHz}$

collimator  
 $\Phi = 1 \text{ mm}$

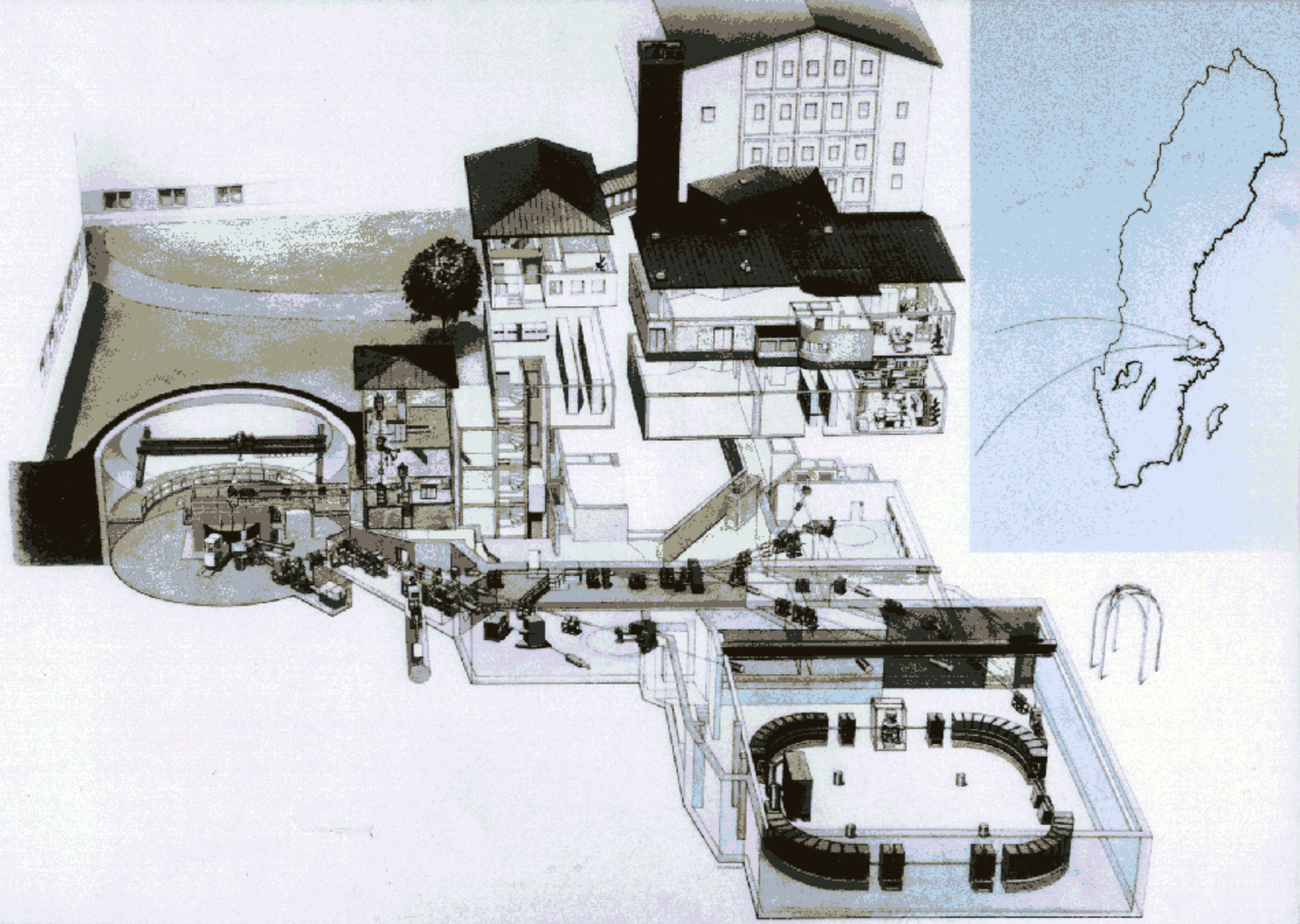
CELSIUS  
beam  
 $\Phi = 4 \text{ mm}$

pellet stream  
 $f = 20 \text{ kHz}$   
 $v = 60 \text{ m/s}$   
 $\Phi = 30 \text{ }\mu\text{m}$

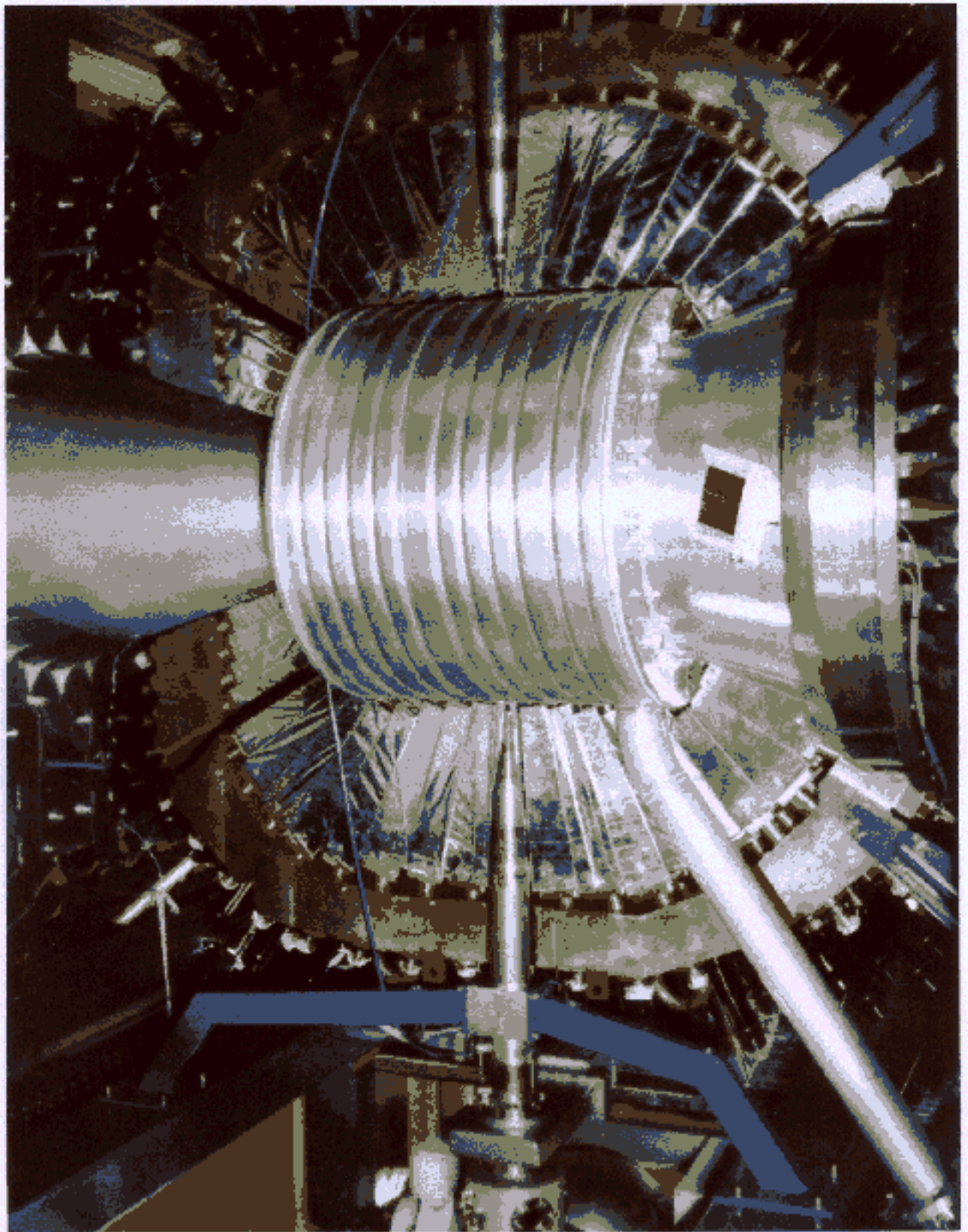
# WASA $4\pi$ Detector

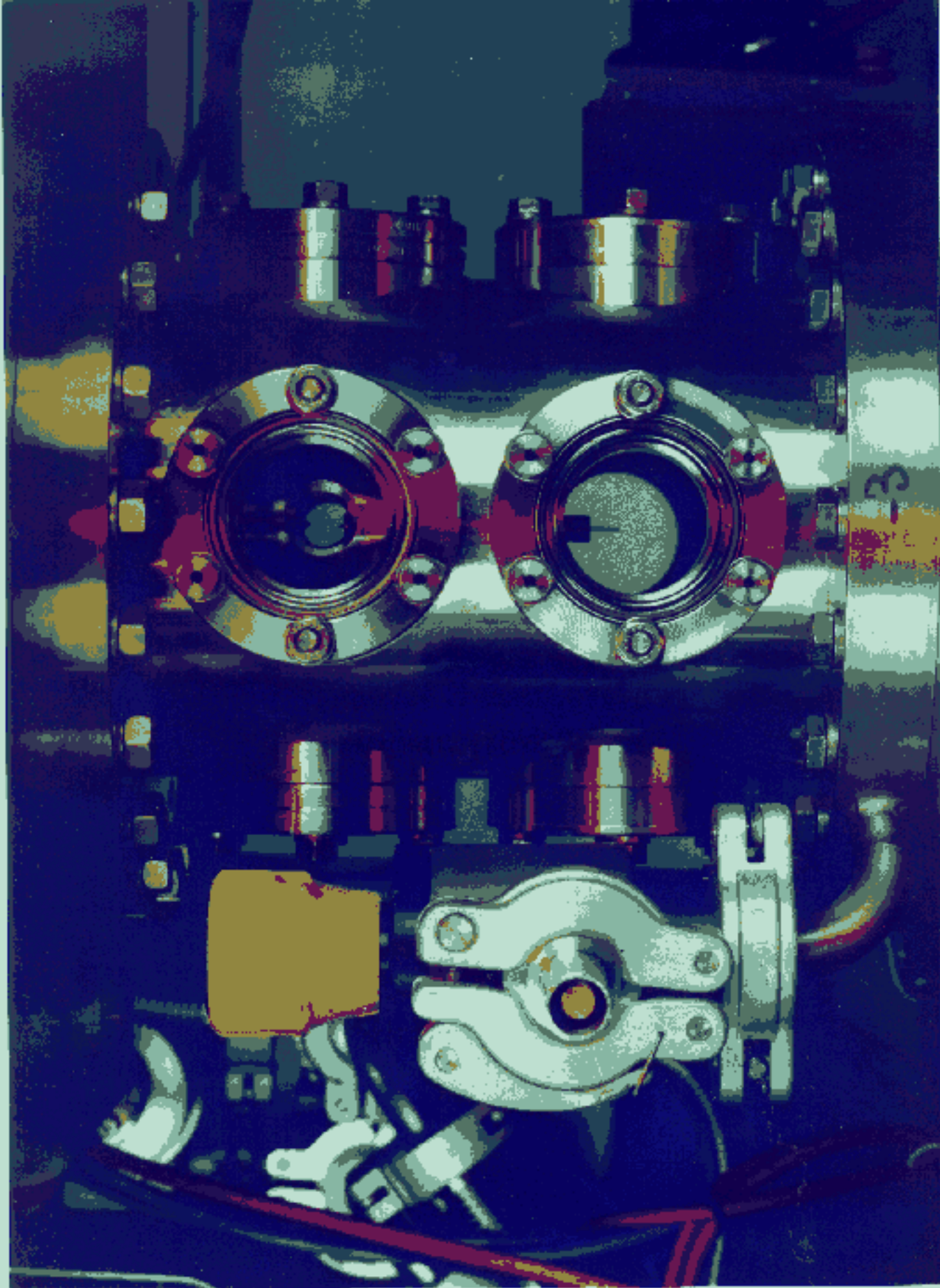


- Covers  $4\pi$  in solid angle
- FD: scattered primary particles
- CD: meson decay products
- Low photon conversion probability
- "Tagging" of  $\pi$  and  $\eta$  production
- Typical event rate: 5 MHz

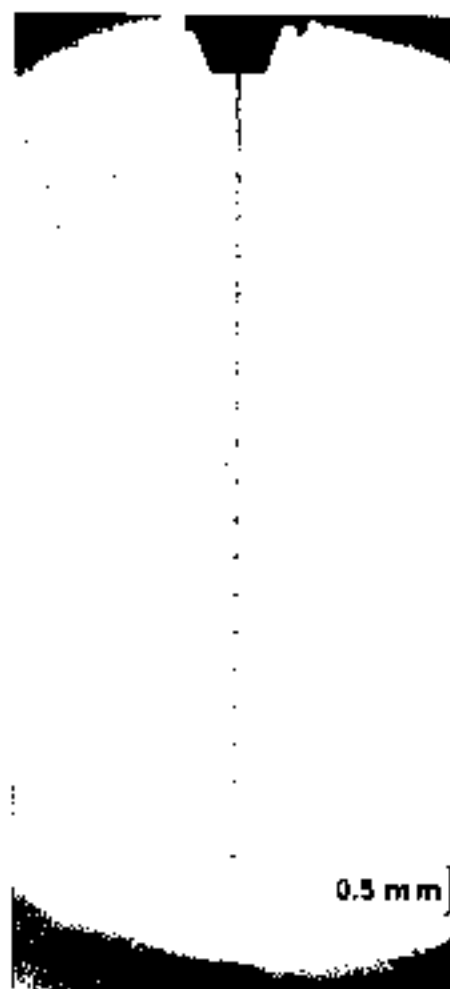








The cover picture shows the central part of the pellet-target generator. The production of hydrogen pellets, recorded at the upper observation window, is shown to the right [B. Trostell, NIMA 362(1995) 41]. The pellet-target system has been installed at the CTI STUS ring and tested as described in section III.2.1.3.5.



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Printing: Centraltryckeriet i Uppsala