

Test of an Hydrogen liquid target

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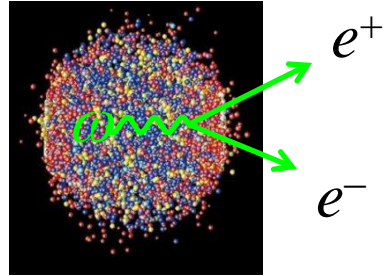
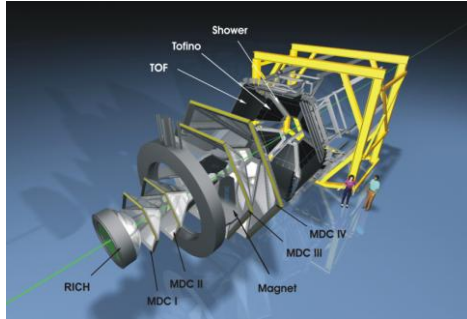
IPN Orsay

PAC Tandem 14-15/02/2013

- Physics motivations
- The liquid target
- The proposed experiment

HADES program at GSI

High Acceptance Di-Electron Spectrometer

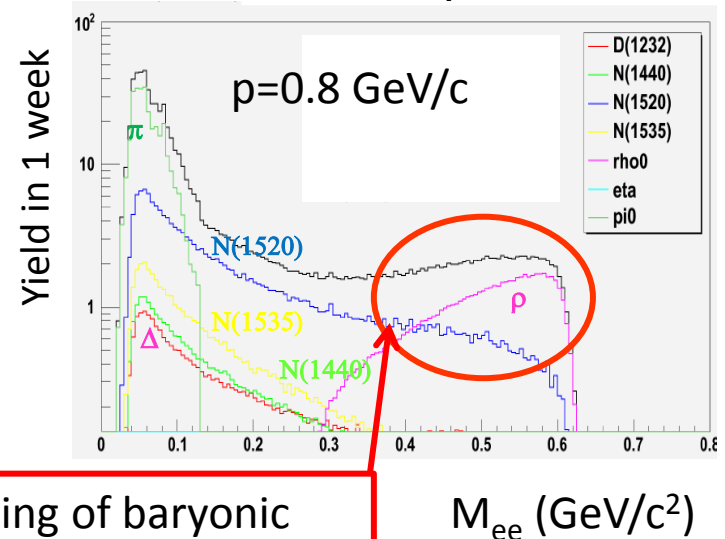


- ✓ *Study of vector meson properties in nuclear matter in **A+A** and **p+A** reactions*
- ✓ **pp/pn** reactions
 - *reference for medium effects*
 - *Selective study of dielectron sources (baryonic resonances)*

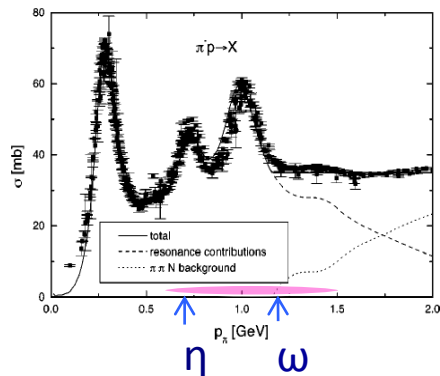
project for 2013/2014

measurements with HADES of e^+e^- , π^\pm , K^\pm in πp and πA reactions in the region of baryonic resonances with masses between 1.4 and 2.0 GeV/c²

Selection of $\pi^-p \rightarrow e^+e^- n$
H Kuc PhD Orsay/Cracovie



Sensitivity to coupling of baryonic resonances to vector mesons (link to **electromagnetic structure**)



- **LH₂ target built in 2000 at IPN**
- **2005-2007 at GSI, malfunction of target in pp reactions (1.25-3.5 GeV)**
 - Every 2-3 minutes, target got empty
 - Transition time < 0.5 s
 - Empty period duration: about 10 s
- **Proposed explanations**
 - Vaporisation by beam heating
 - Valve problem

The HADES LH₂ target

Beam



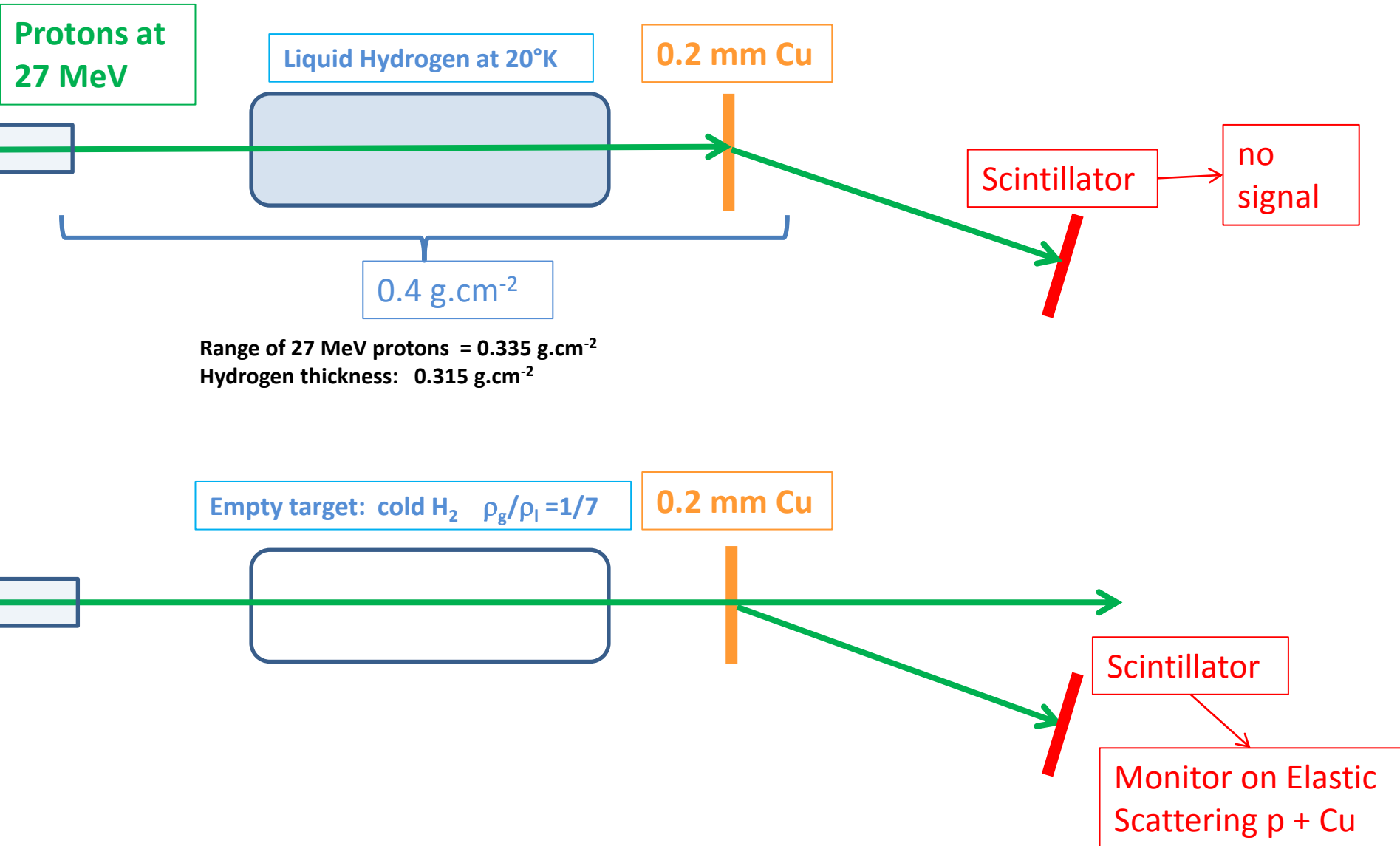
- **At IPN Orsay**

- Target opening and 'valve' checking/repairing (march)
- Functional test in DEGA room (march/april)
- Test with a proton beam at the Tandem to check the energy deposit effects in the liquid (may/june)

- **At GSI**

- Test experiment at GSI (autumn) with pion beam and solid targets
- Physics experiment with pions and liquid target (01/2014-04/2014)

Measurement principle



intensity requirements?

- With HADES at GSI

1. 2005-2007: runs p+p at 1-3 GeV: $5 \cdot 10^7$ p/s with $dE/d(\rho x) = 4 \text{ MeV.g}^{-1}.\text{cm}^2$ over $\varnothing \approx 1 \text{ mm}$
2. 2014: run π^-+p à 0.7-1.3 GeV/c: 10^6 π^- /s with $dE/d(\rho x) = 4 \text{ MeV.g}^{-1}.\text{cm}^2$ over $\varnothing \approx 15 \text{ mm}$

- At the Tandem

27 MeV protons have $dE/d(\rho x) = 40 \text{ MeV.g}^{-1}.\text{cm}^2 \rightarrow$ need for $I = 0.02$ to 1 pA

Tune at 'high' intensity and further reduction through stripper

Monitor the beam intensity with p elastic scattering on a Cu target located after the empty target

- **2-3 days for on site installation**
 - Positioning
 - Crane: <150 kg
 - Floor area: 5 m²
 - Electrical power: 4 kW
 - Water cooling
 - Hydrogen container
 - Monitoring devices for low intensities
 - Electronic equipment borrowed from RDD
- **3 UBT on an extracted 27 MeV proton beam**

We have to make the pion experiment at GSI 100% successful

