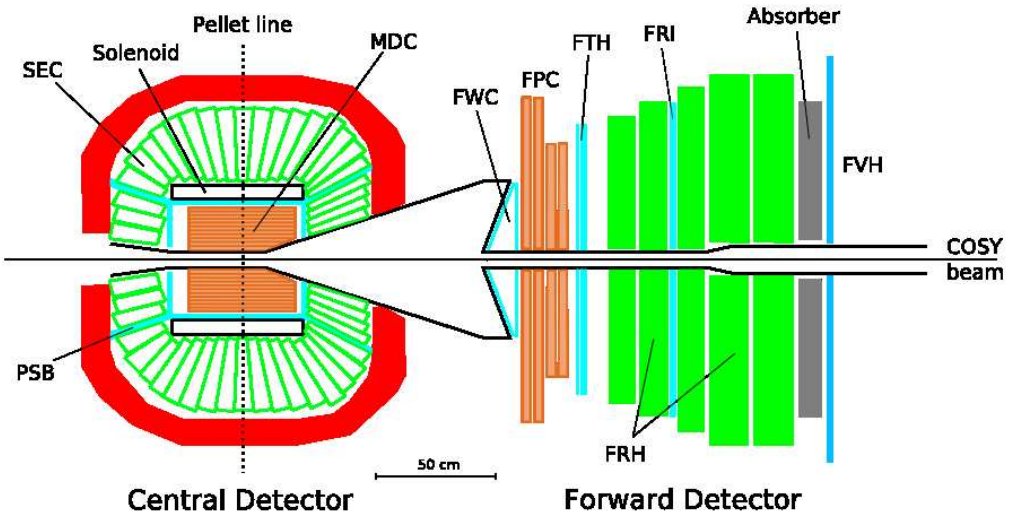
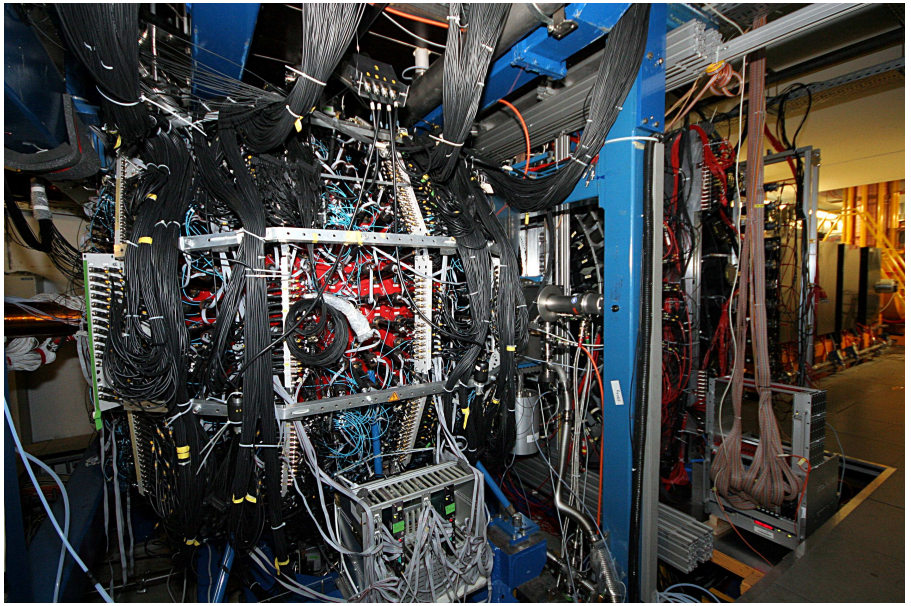
Status of η′ decays at WASA





Magnus Wolke

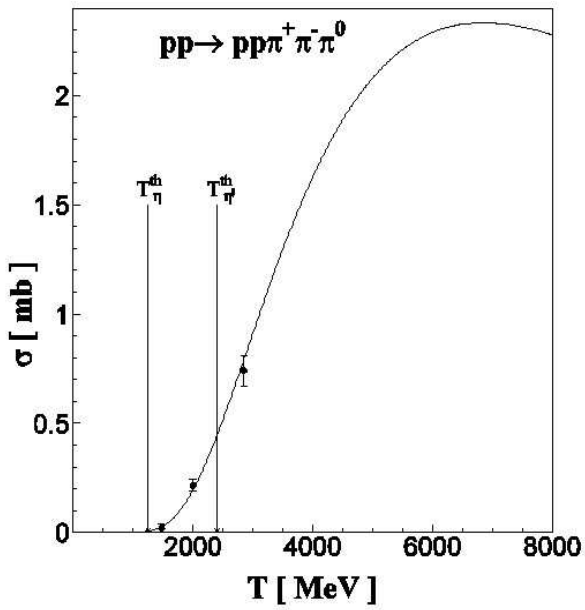
PrimeNet meeting

INFN Frascati, Apr 8, 2009

UPPSALA UNIVERSITET

η′ decays at WASA

	$pp \to pp\eta$	$pp \to pp\eta'$	$pd \to {}^3He\eta'$
cross section [nb]	15000	300	only estimates 0.3 – 30
production rate [1/s] at $L = 1 \cdot 10^{31} cm^{-2} s^{-1}$	150	3	0.003 – 0.3
(design $L = 1 \cdot 10^{32} cm^{-2} s^{-1}$)			



larger cross section

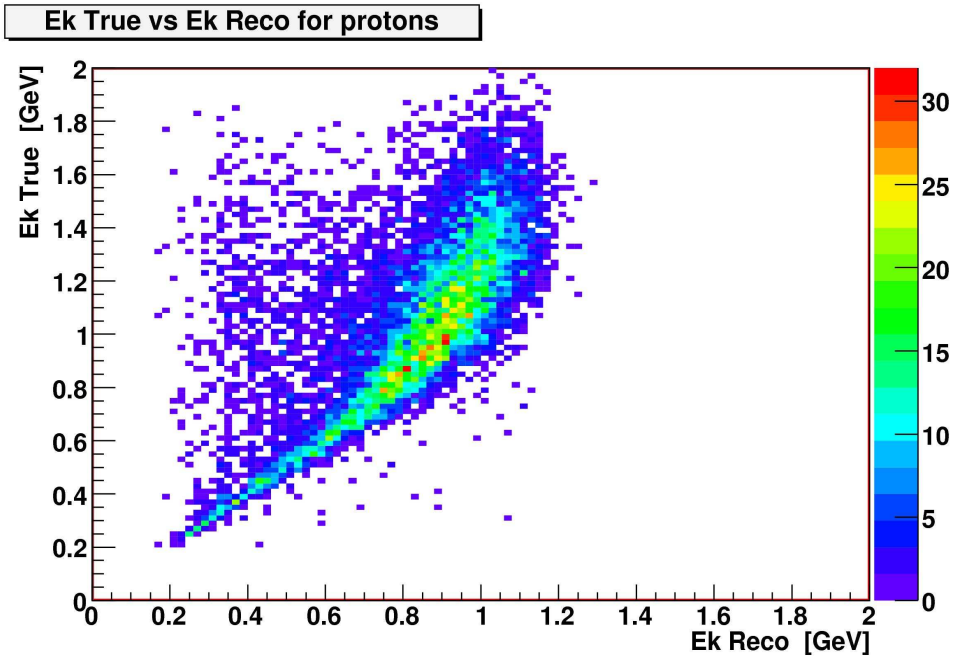
larger nonresonant bg

tagging on ^3He
→ trigger without bias on decay system

⇒ **talk by J. Zlomanczuk**

High Energy Proton Reconstruction

MC: True vs reconstructed kinetic energy



uncertainty in reconstruction of protons from $pp \rightarrow pp\eta'$

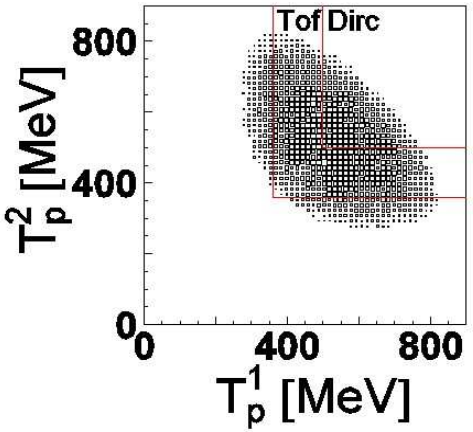
uncertainty in reconstruction of high energy protons from $pp \rightarrow ppX$

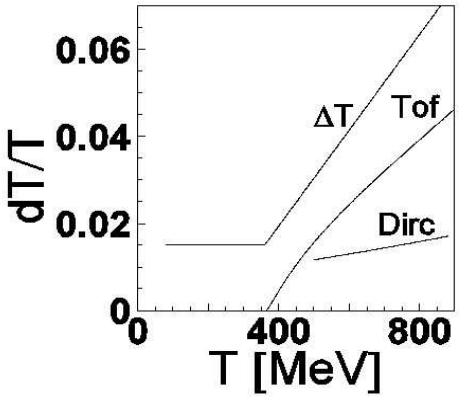
dE/(d)E $\Rightarrow$

Time-of-Flight
installed summer 2008, analysis in progress

DIRC detector
2010*)

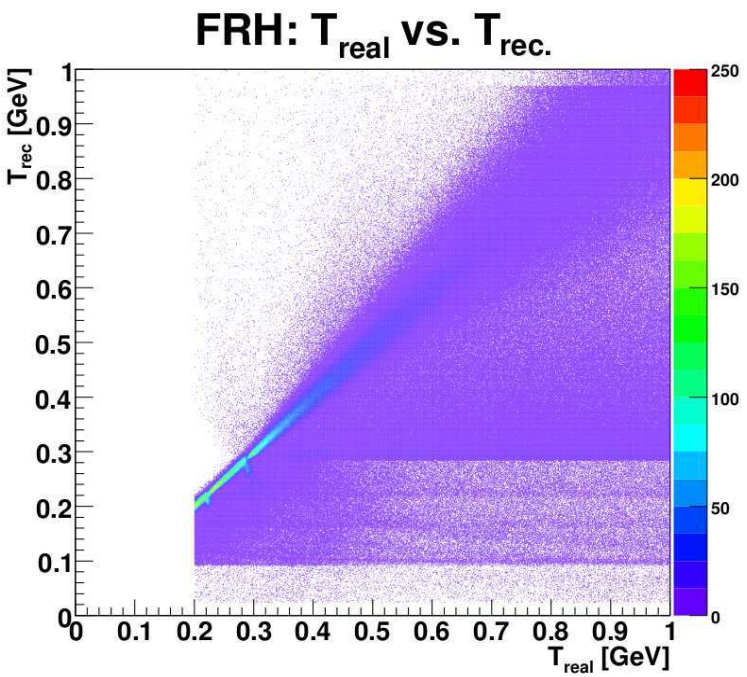
*) provided funding is obtained

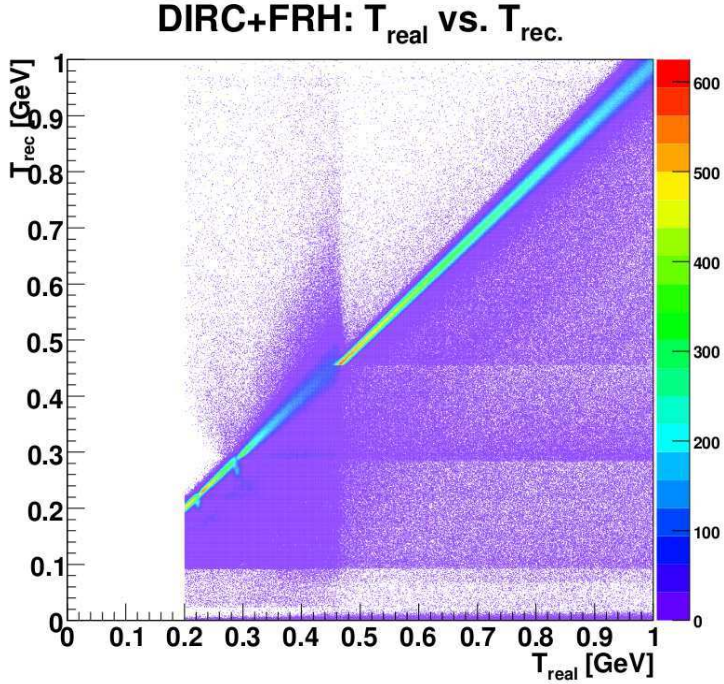




WASA DIRC detector

MC: reconstructed vs true kinetic energy

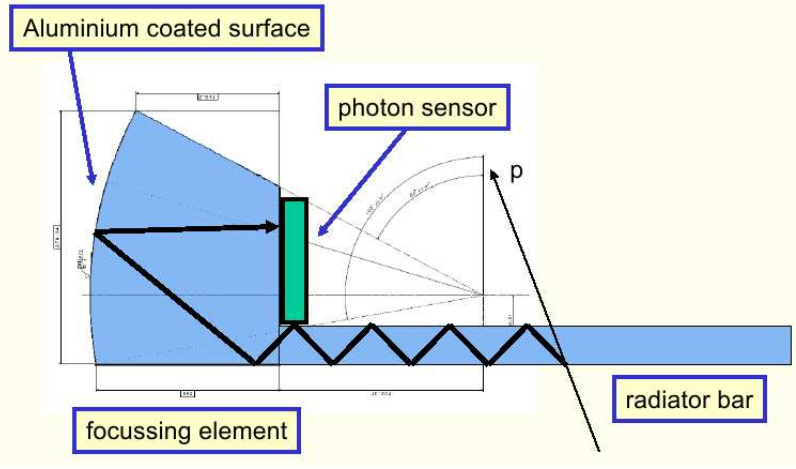




plexiglass (n=1.491) radiator,
casted and polished surfaces

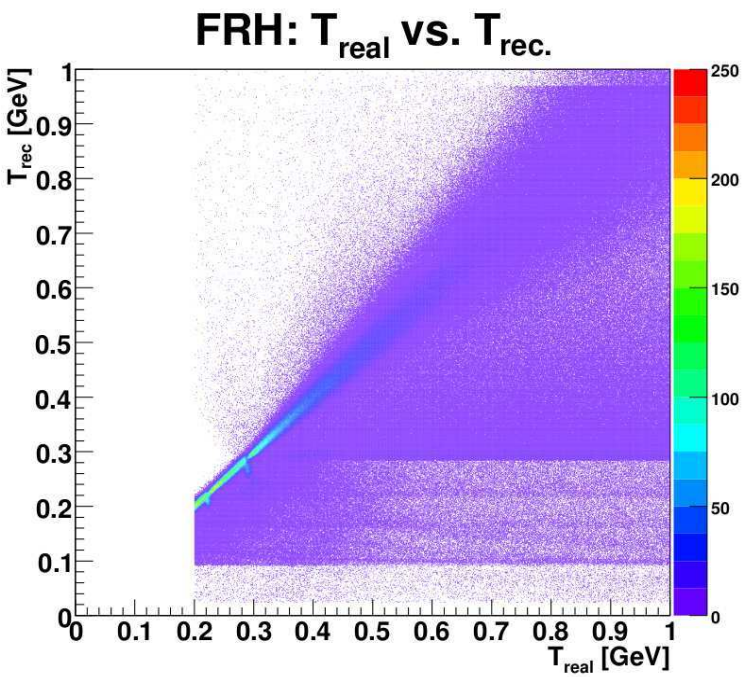
focussing element
- aluminium coated parabola surface
- total reflection at polynomial surface

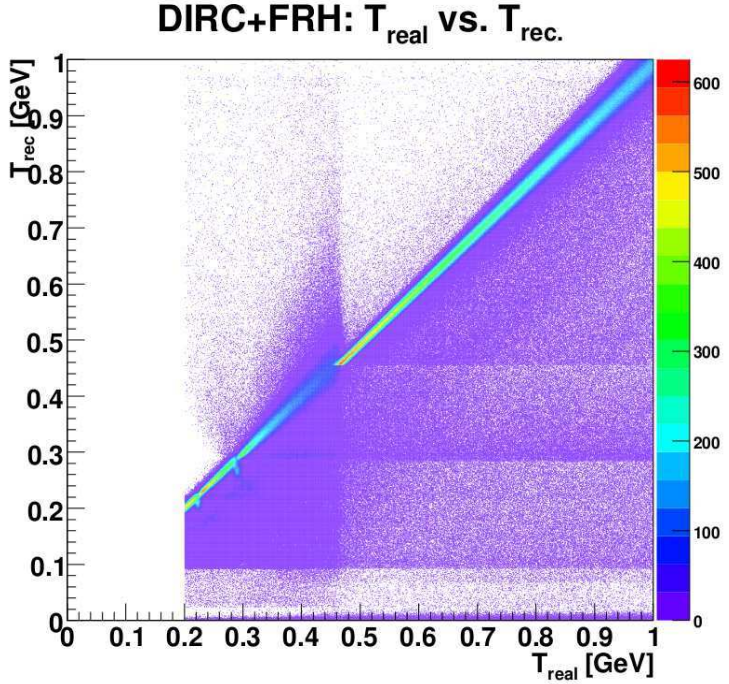
MAPMT readout



PANDA DIRC prototype at WASA

MC: reconstructed vs true kinetic energy

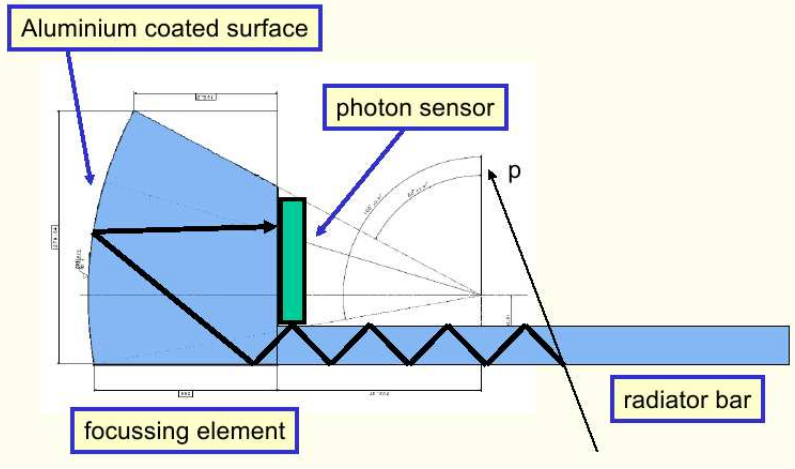




plexiglass (n=1.491) radiator,
casted and polished surfaces

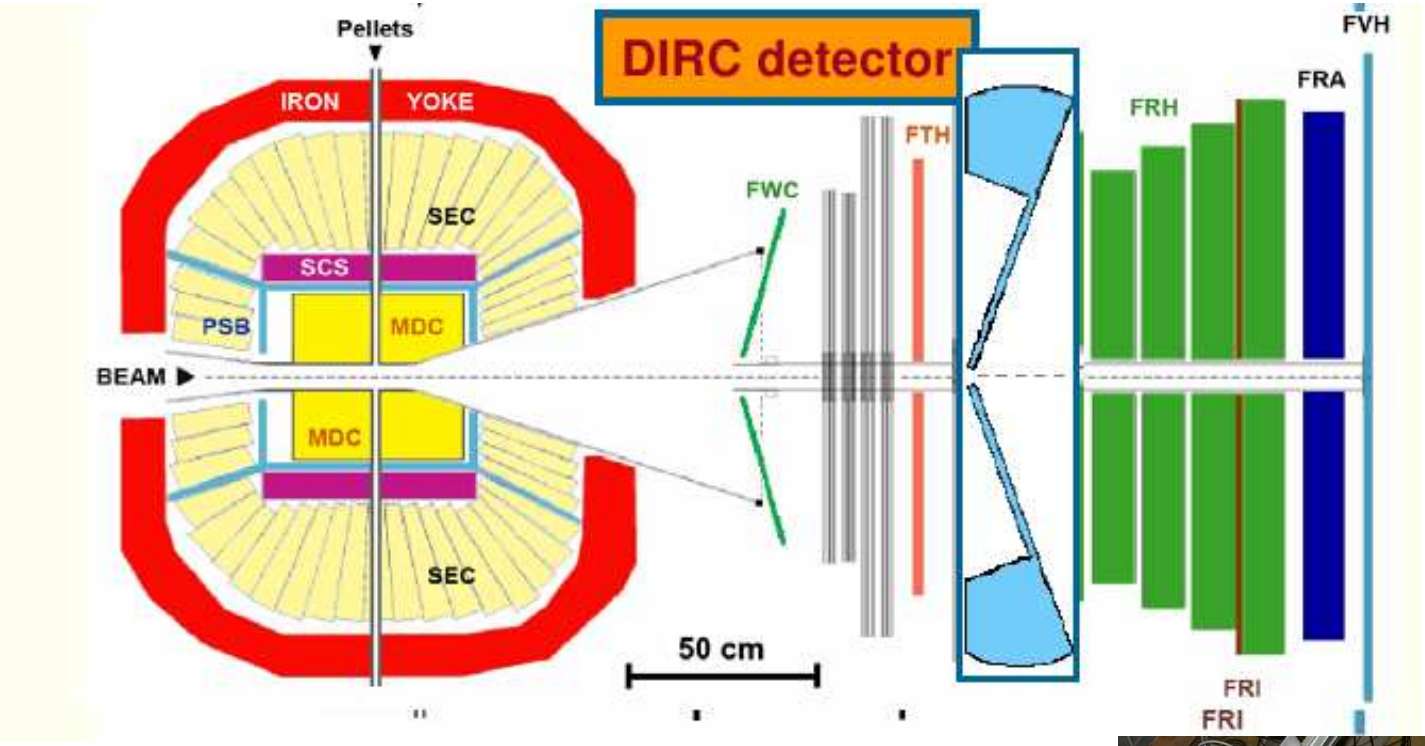
focussing element
- aluminium coated parabola surface
- total reflection at polynomial surface

MAPMT readout



PANDA DIRC prototype at WASA

Experimental Setup

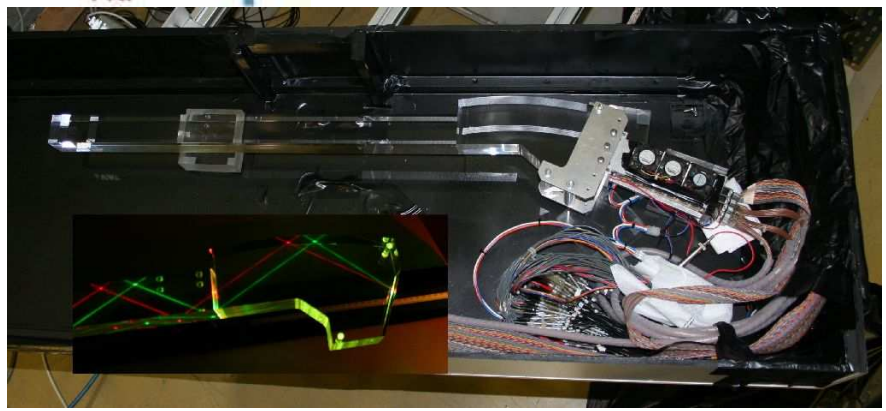


replace one FRH layer by DIRC

40 mm radiator thickness

tilted by 20° with respect to beam axis

prototype (of prototype..) tests Oct/Nov 2008 at COSY

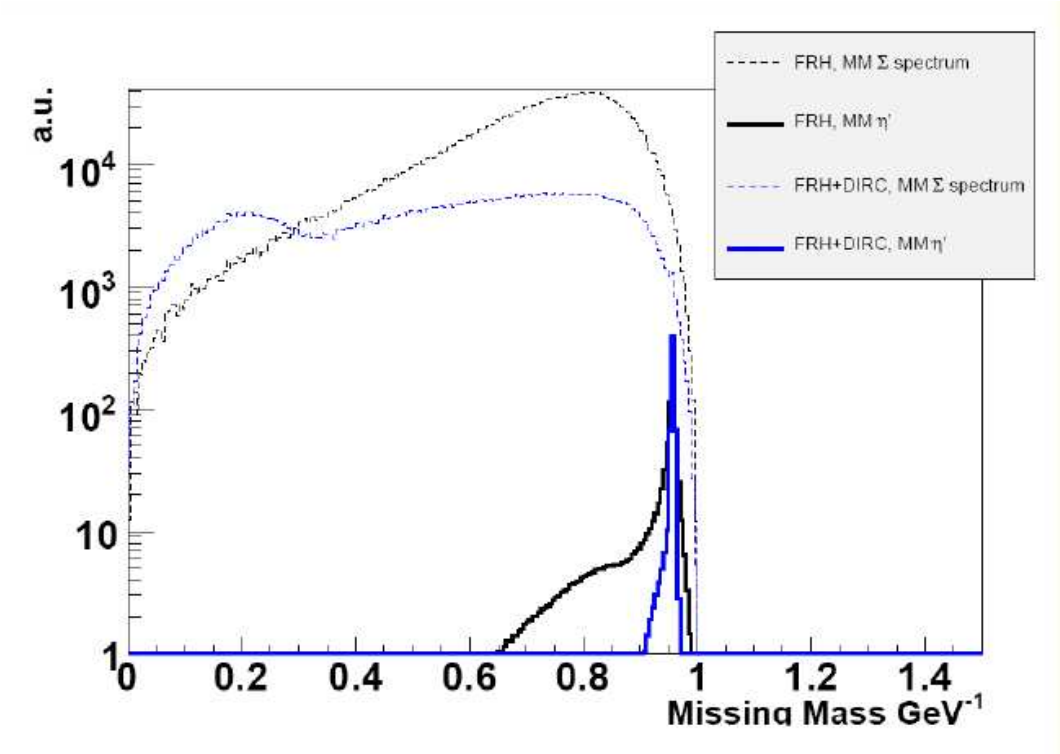


Application to BMBF by
Universities Bonn, Erlangen, Tübingen
in collaboration with Edinburgh/Giessen

funding decision: about now...

Background for η' in $pp \rightarrow ppX$

Missing mass reconstruction with(out) DIRC



here: worst case scenario!

No cuts on decay system!

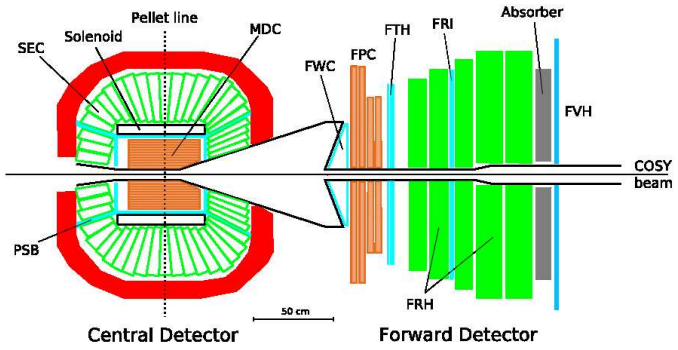
No PID with dE/TOF/DIRC!

p, $\pi^{\pm}$ separation with TOF/DIRC in future!

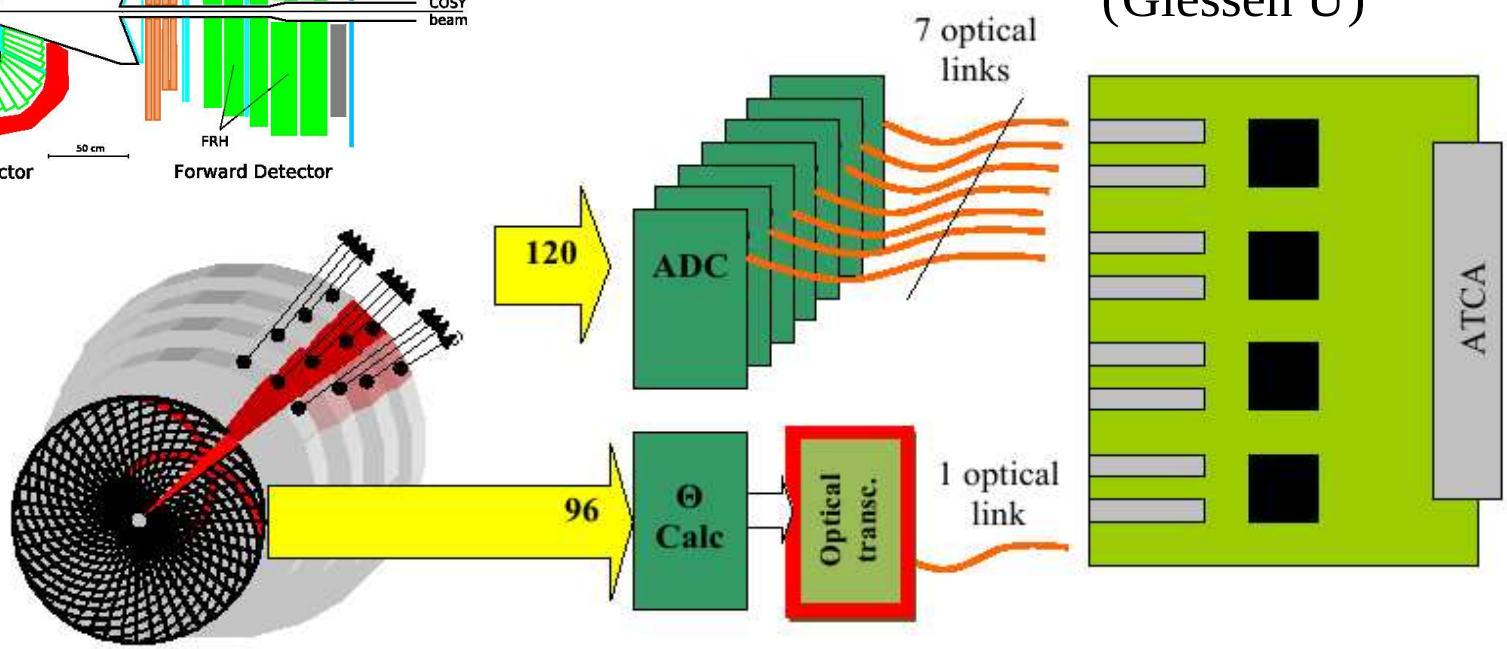
$\Rightarrow$ advanced trigger system mandatory

First Step: Missing Mass Trigger

Missing mass trigger



PANDA compute node
(Giessen U)



Jun 2009: functionality test

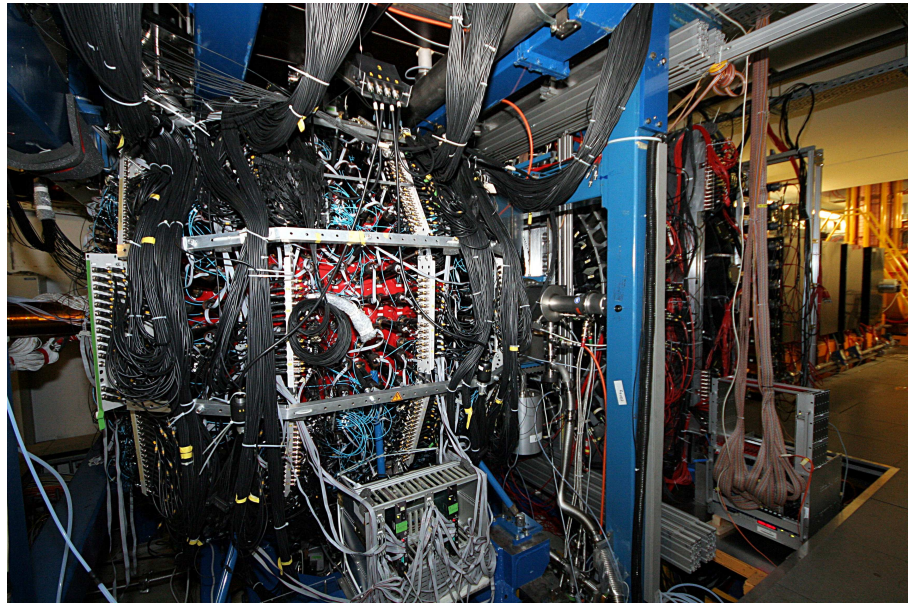
II/2009: algorithm implementation and test

Uppsala, FZ Jülich

Status of η' decays at

huge physics potential

huge nonresonant background



first signals...

in $pd \to {}^3He\,X$ (?) $\Rightarrow$ next talk by J.Z.

in $pp \to pp\,X$ no signal (yet)

mandatory improvements:

tagging in pp with ToF **and** DIRC

advanced (hardware) trigger algorithm(s)

high statistics η' samples: **from 2011**