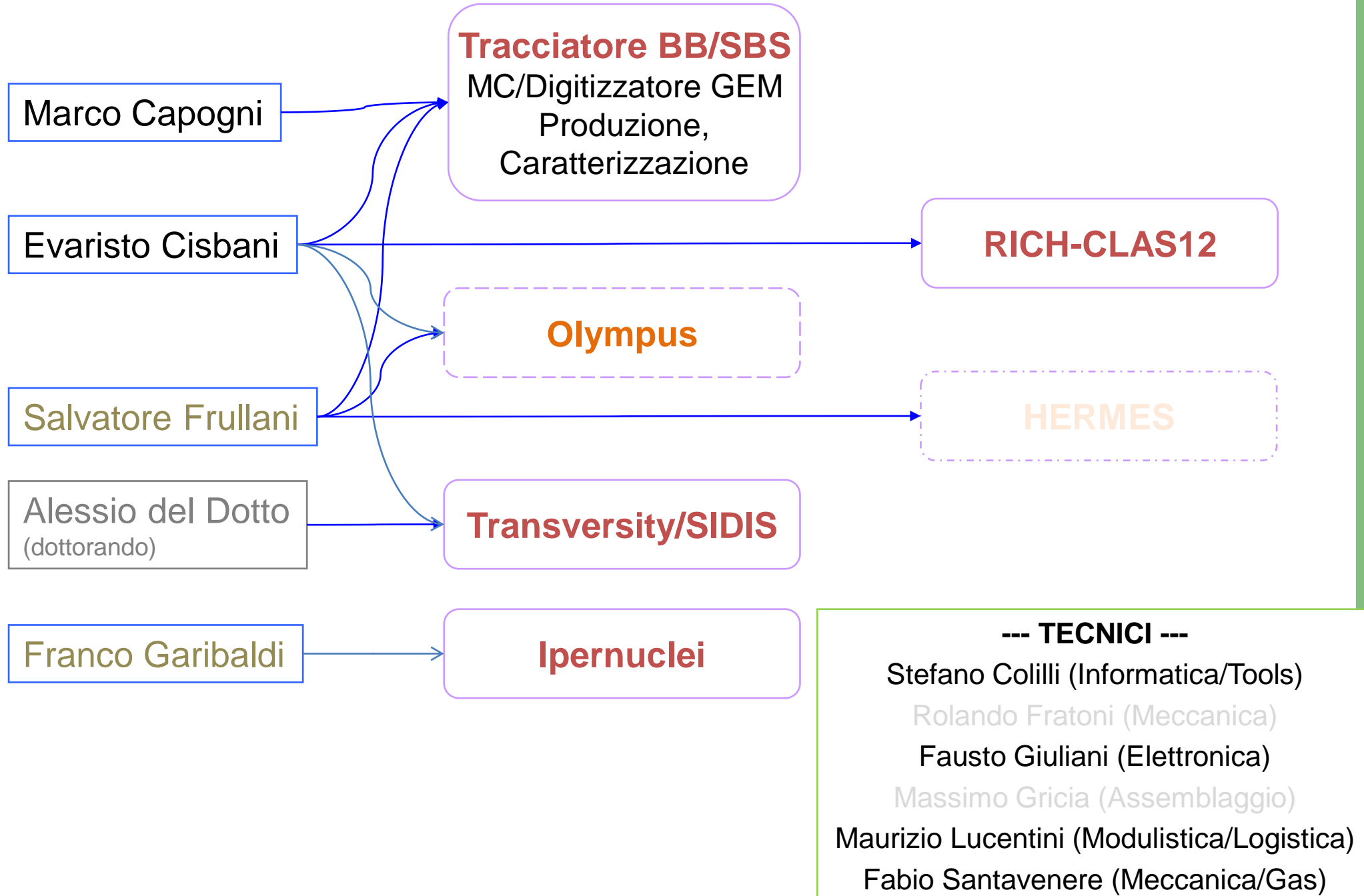
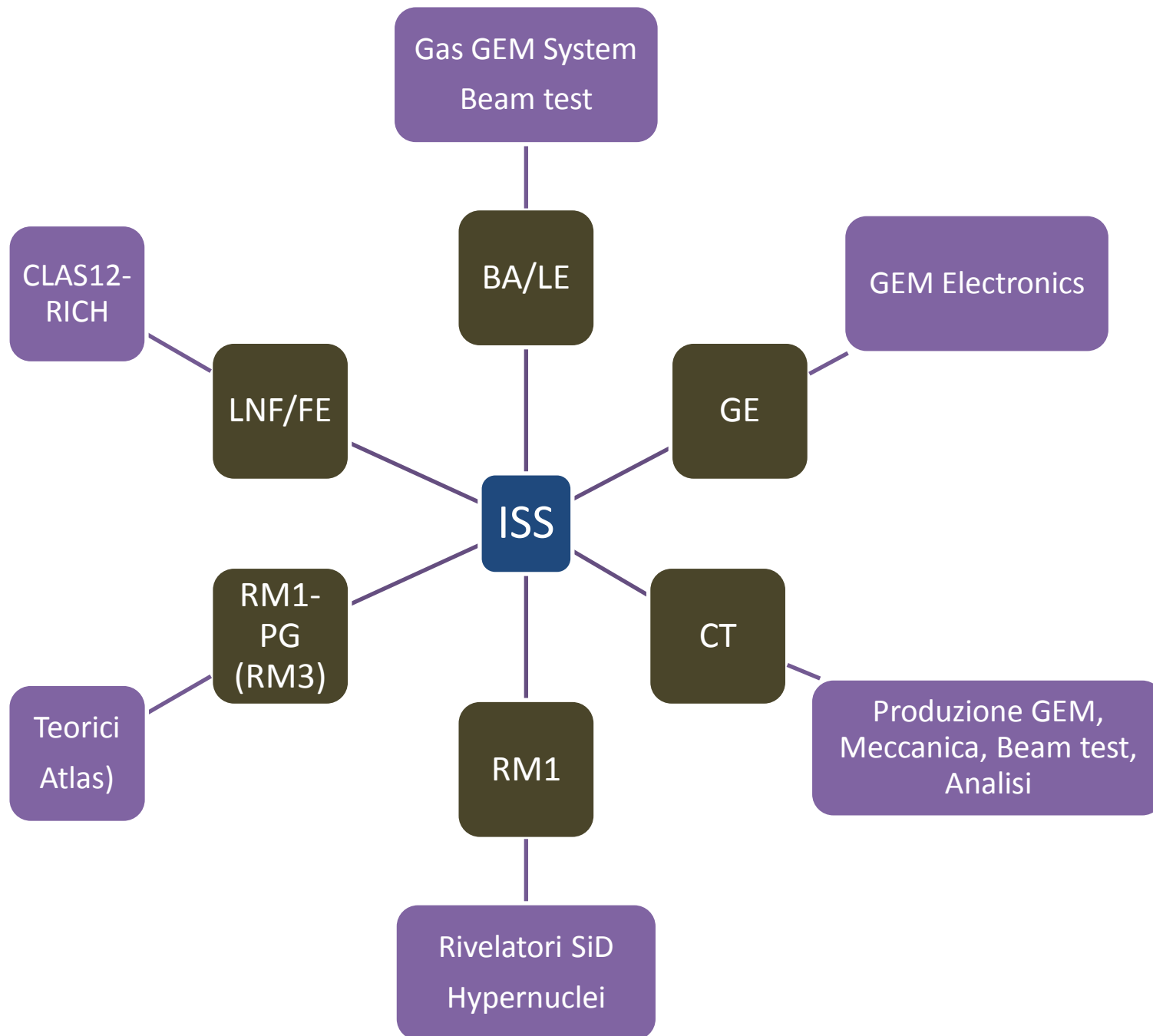


Gruppo JLab12/ISS Plan 2013-2015



Collaborazioni Interne



Attività in corso

- Analisi Esperimenti
 - **Ipernuclei**: discussione interna articolo 9Be
- Preparazione Esperimenti:
 - Esperimento su **Sezione d'urto Ipernucleare**
 - **A1n**
- Apparat: **Tracker per SBS**:
 - Sviluppo Tracciatore GEM
 - Supporto ad Olympus
- Contributo a sviluppo: **RICH-CLAS12**

Attività futura (2012~2015)

Tracciatore GEM

Produzione (2012-2014)

Caratterizzazione (2012-2014)

Test Laboratorio

Beam Test

Misure gamma Casaccia

Commissioning (2013-2014)

Sviluppo Algoritmi tracking

Finalizzazione MC SBS

Support SOLID

Supporto RICH

Elettronica Test

...

Preparazione Esperimenti

A1n (GEM in BigBite)

TMD-SIDIS (HERMES RICH ?)

Sistematica su estrazione 3He

Valutazione Hypernuclear Phys.

Proposte nuovi esperimenti

Analisi

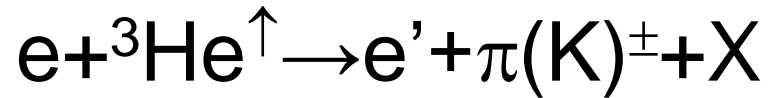
Estrazione asimmetria K su Transversity 6
GeV

Halla Experiments @ 12 GeV

Exp.	Short Range Correlation	Form Factors	Structure Function, PDF/TMD GPD	PVES (beyond SM)	
Inclusive 3H, 3He	$\sigma(^3\text{He})-\sigma(^3\text{H})$ 2N, 3N Isospin dep.				HRS
GMP, GEP/GMP (GEP5), GMN		σ_{elastic} Pol transfer Double pol.			HRS, SBS&BB SBS&BB \supset GEM
Tritium			DIS off 3H 3He \rightarrow F2n/F2p		BB&HRS (maybe SBS)
A1n			DIS of 3He \rightarrow A1n \sim ($g1+\gamma$ g2)		HRS&BB \supset GEM
SOLID-3He			SIDIS / π SSA on N (3D Sivers + Transversity)		Dedicated Solenoid
SIDIS			SIDIS / π + K SSA on N (2D Sivers + Transversity)		SBS&BB \supset GEM
DVCS			Exclusive reaction on H \rightarrow GPD		HRS & Dedicated detector
Moller				$\vec{e}^-e^- \rightarrow e^-e^- \Rightarrow$ $\sin^2/(\mathcal{G}_W)$ (0.1 %)	Dedicated Detector
SOLID-PVDIS				A_{PV} (0.5%), $\sin^2/(\mathcal{G}_W)$ (0.6%)	Dedicated Solenoid
PREX-II				Neutron skin in Pb	HRS

Green: Contribution, Yellow: possible support

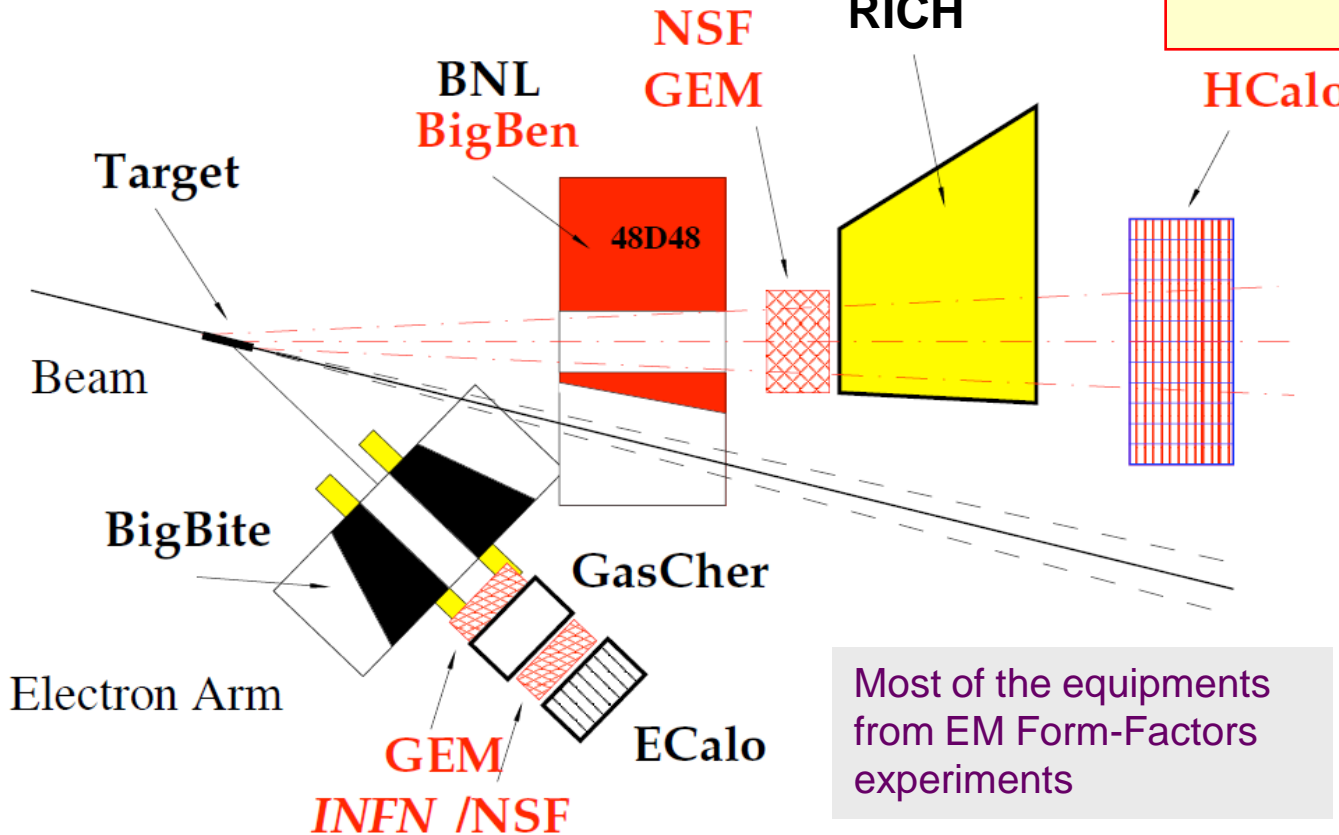
SIDIS: Experimental Setup



Hadron Arm

HERMES
RICH

Measure the SSA of SIDIS processes $n^{\uparrow}(e, e' p^{\pm}) X$ and $n^{\uparrow}(e, e' K^{\pm}) X$



BB: e-arm at 30°
 $\Omega = 45$ msr
 GEM Tracker
 Gas Cherenkov Shower

\leftarrow GMn/PR-09-019

SBS: h-arm at 14°
 $\Omega = 50$ msr
 GEM tracker
 excellent PID / RICH
 Hadron CALO

Beam: $50 \mu\text{A}$, $E=8.8$ and 11 GeV (80% long. Pol.)
 Target: 65% polarized ${}^3\text{He}$ \leftarrow GEn(2)/PR-09-016
 \Rightarrow Luminosity: $1.4 \times 10^{37} \text{ cm}^{-2}\text{s}^{-1}$, 0.05 sr

Event rate: $\sim 10^4 \times$ HERMES
 60 days of production expected
 stat. accuracy:
1/10 of proton HERMES

PAC38 A- Approved experiment

From ${}^3\text{He}$ to n (nuclear effects)

Proven to work in DIS extraction (C. Ciofi degli Atti et al. 1993)

$$A_3^{exp,i} \simeq 2f_p p_p A_p^i + f_n p_n A_n^i$$

$$p_p = \int dE \int d\vec{p} P_{\perp}^p(\vec{p}E) = -0.028 \pm 0.004$$

$$p_n = \int dE \int d\vec{p} P_{\perp}^n(\vec{p}E) = 0.86 \pm 0.02$$

$$f_{p(n)}(x, z) = \frac{\sum_q e_q^2 f_1^{q,p(n)}(x) D_1^{q,h}(z)}{\sum_{N=p,n} \sum_q e_q^2 f_1^{q,N}(x) D_1^{q,h}(z)} \simeq 0.2$$

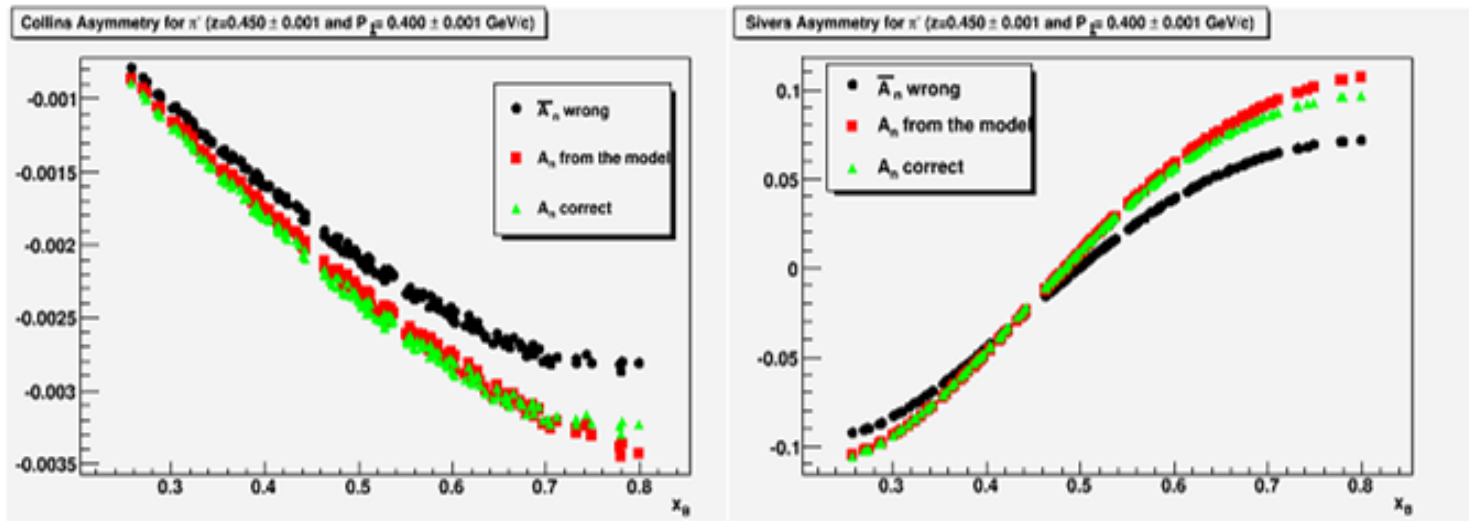
$$A_{correct} = \frac{1}{p_n f_n} \left(A_3^{exp,i} - 2p_p f_p A_p^{exp,i} \right), \quad A_{wrong} = \frac{1}{f_n} \left(A_3^{exp,i} \right)$$

Scopetta approach (2007)

- .Bjorken limit,
- .Impulse Approximation

Assume asymmetries \rightarrow apply realistic spectral function \rightarrow extract them back.

Scopetta approach integrated in the MonteCarlo used to simulate the proposed experiment



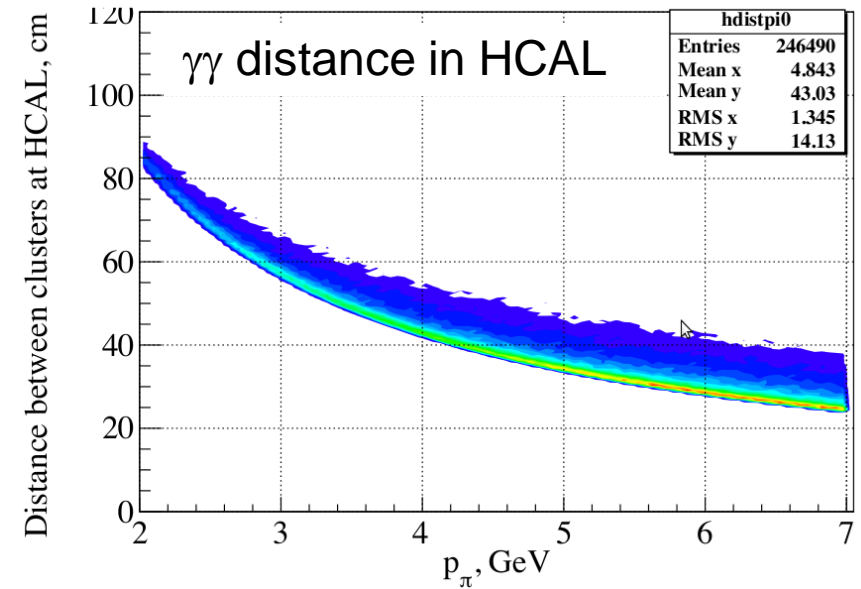
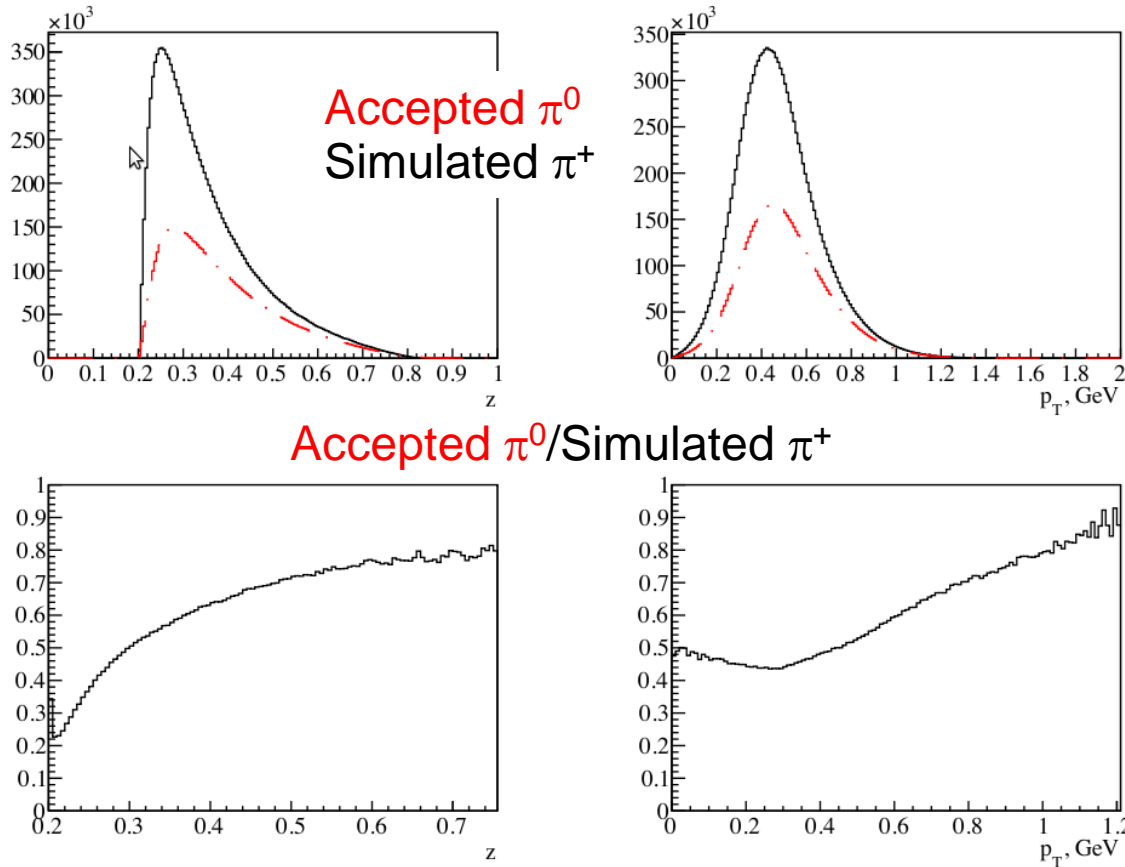
A. Del Dotto (2011)

Improvement in progress (Del Dotto, Salmè, Scopetta):

- .Light front ${}^3\text{He}$ spectral function (consistent fully Poincarè covariant formalism)
- .Release Bjorken limit

Working on experimental strategies to evaluate predictions

π^0 detection



HCAL Energy resolution = $14\%/\sqrt{E}$

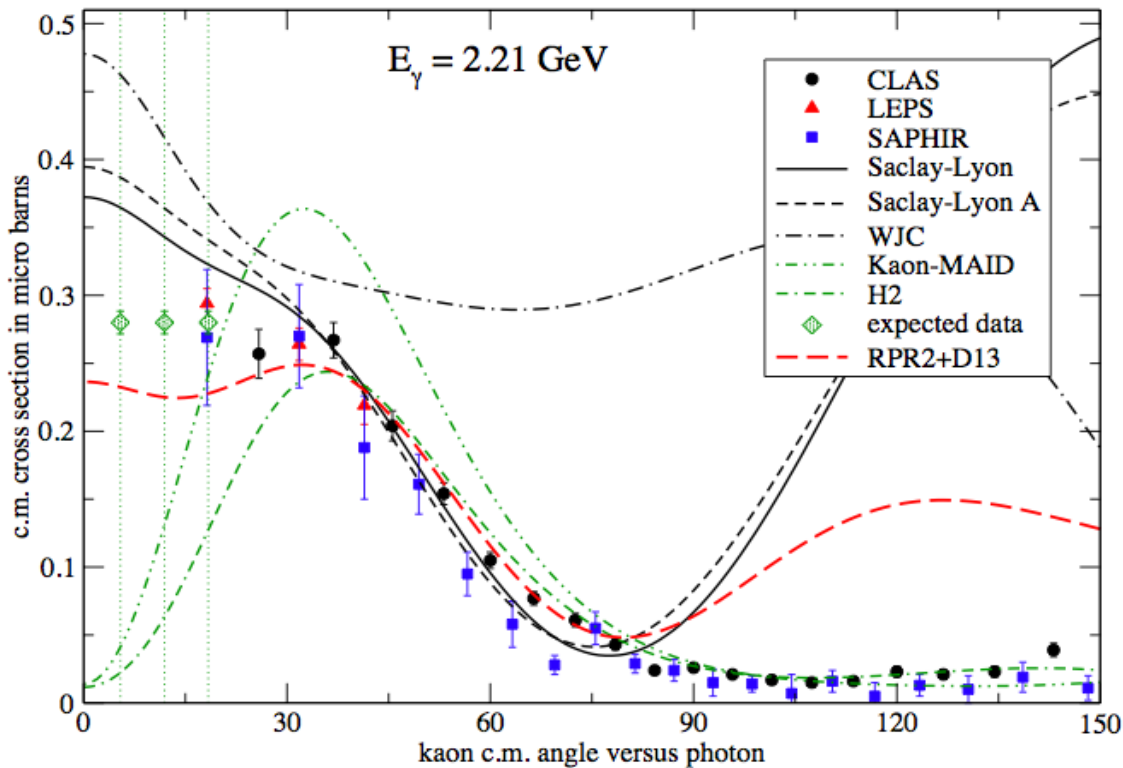
Invariant mass reconstruction resolution ~ 19 MeV (~ 12 MeV in HERMES)

Kinematic variables reconstruction ~ 4 better than planned bin width

Possibility to detect ϕ by K^+K^- decay, related gluon polarization (C. Weiss seminar)

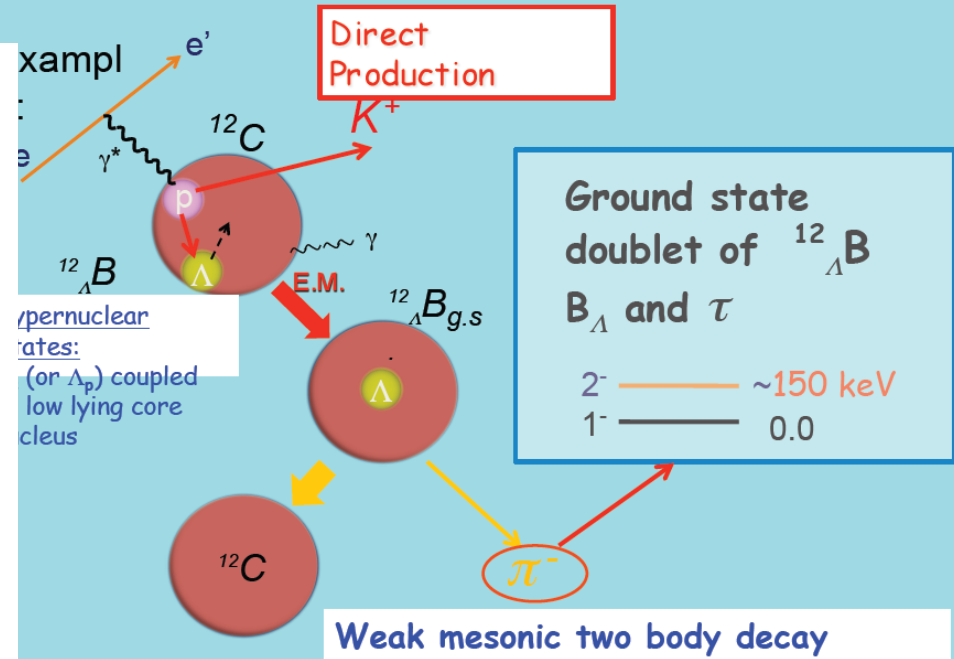
SBS + BB as improved HERMES detector !

E-07-012 - The Angular Dependence of $^{16}\text{O}(e,e'K)^{16}\text{N}_\Delta$ and $^1\text{H}(e,e'K)\Delta$

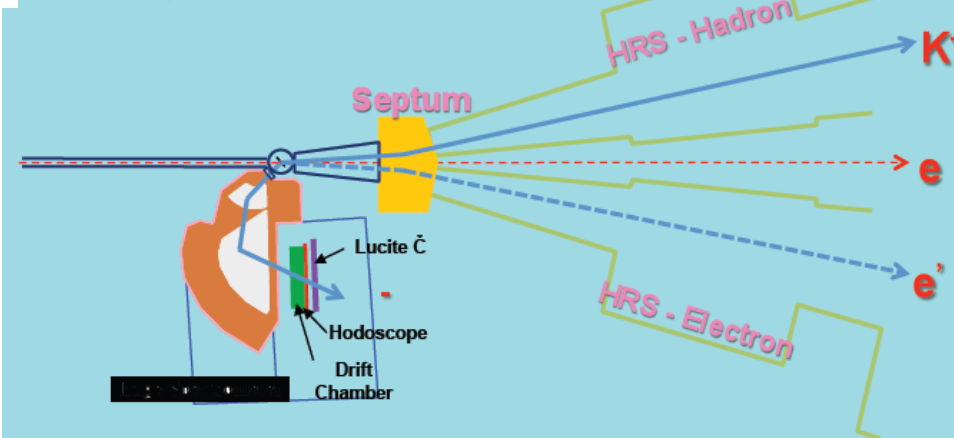


- These data and, especially, the ratio of HN to the elementary cross section will give:
- new valuable information on hypernuclear structure (including spin assignment of produced hypernuclear states), and reaction mechanisms
 - the modification of the dynamics of the $(e,e'K^+)$ process in the nuclear medium.

Decay Pion Spectroscopy to Study Δ -Hypernuclei

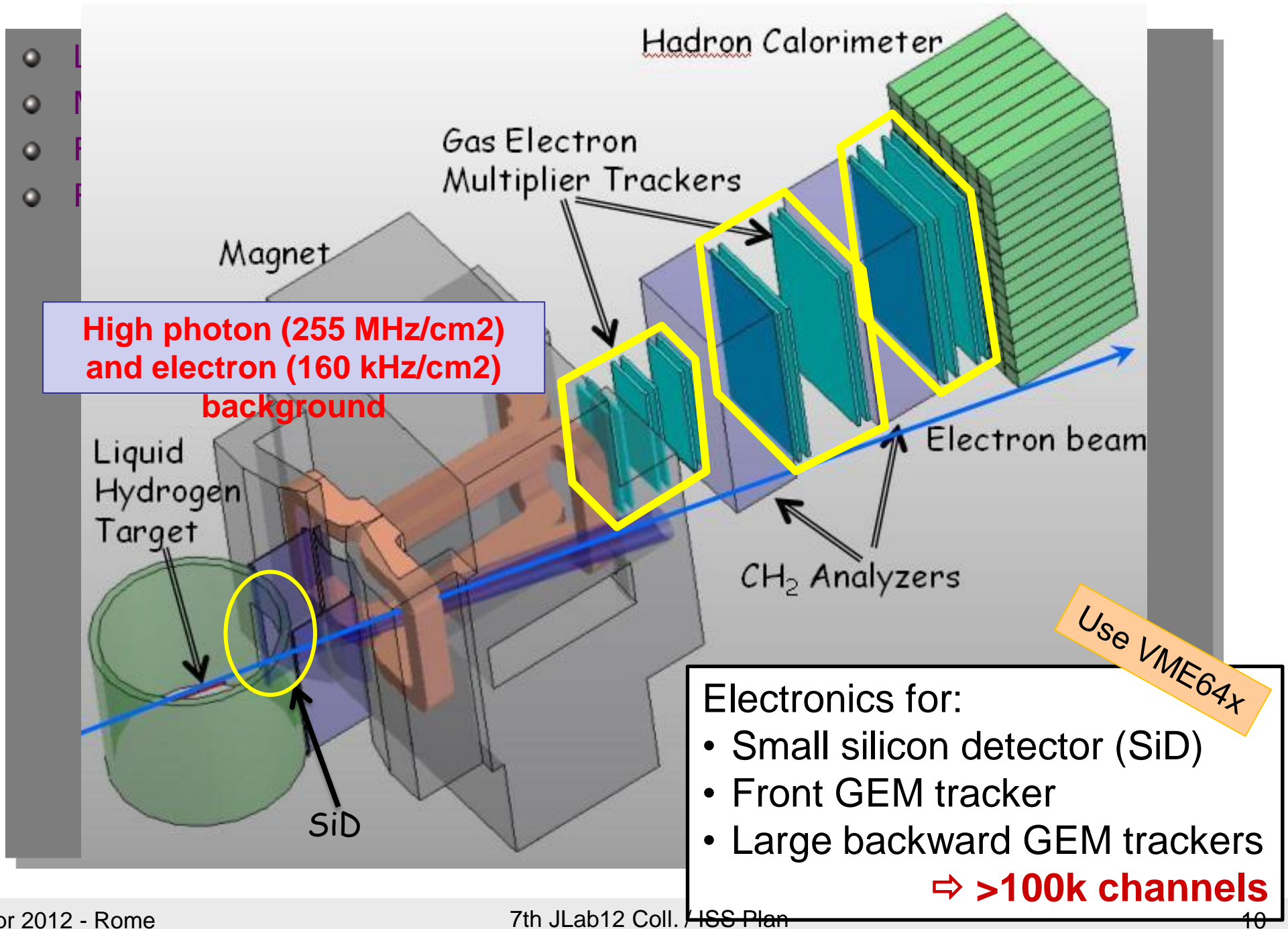


Trigger II: HRS(K) – HRS(e') - Spectroscopy Experiment



Trigger I: HRS(K) – Enge() - Decay Pion Experiment

SuperB_{igbite} Spectrometer in Hall A



GEM Tracker

- Production
- Complete Mechanical Design
- Develop a robust tracking algorithm
- Finalize the complex firmware of the DAQ
- Test and Calibration

GEM Funding (whole project 2013-2015)

