



SANE Readiness Review

HMS Status After GEP-III

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SANE: Spin Asymmetries of the Nucleon Experiment

- SANE is a single arm inclusive scattering experiment.
- For electrons detection SANE will use Big Electron Telescope Array - BETA.
- SANE will measure proton spin structure function $g_2(x, Q^2)$ and spin asymmetry $A_1(x, Q^2)$ at $2.5 \leq Q^2 \leq 6.5 \text{ GeV}^2$ and $0.3 \leq x \leq 0.8$.
- Earliest possible start of SANE installation, 20 May 2008.
- Assuming 2 month installation, earliest start data for SANE: 20 July 2008.

Why we need HMS for SANE ?

- I will not go over the physics details of those uses of the HMS.
- I will report on the hardware, detectors requirements to do the proposed measurements.
- Let briefly list the ideas for what purpose will be used HMS.

What we expect from HMS during SANE

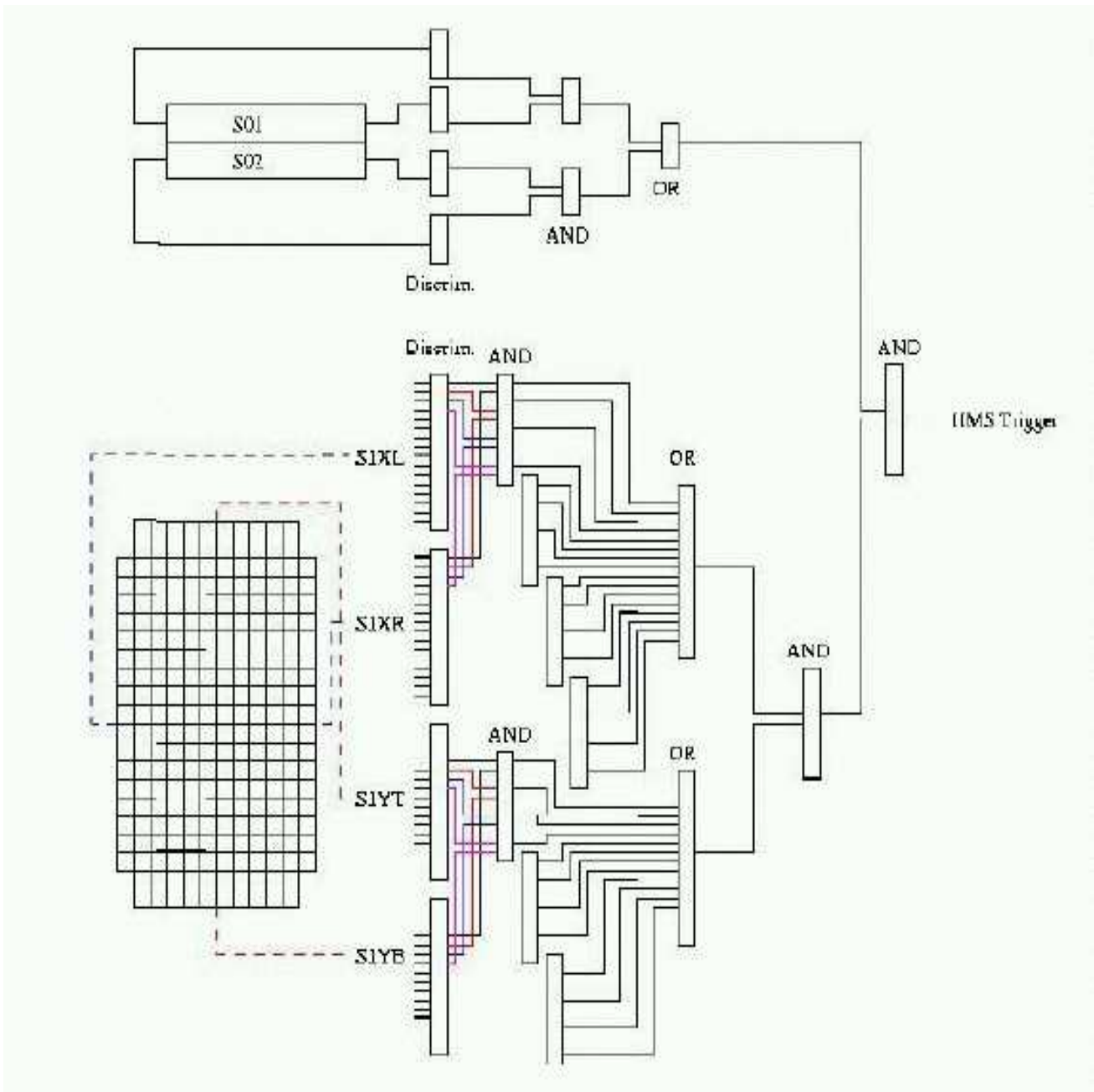
- SANE for the asymmetry measurement uses only a single-arm. An absolute energy calibration of the BETA spectrometer is needed.
- Protons in the HMS in coincidence with BETA will define electrons of known energy in the calorimeter from e+p elastic scattering. The HMS will detect protons of 1 to 2.2 GeV/c.
- The HMS will be used to measure the rate of positron events as a function of scattered energy, to complement the charge sign identification provided by the forward tracking hodoscope.
- The HMS also will be used to check effects of magnetic field on tracks to BETA.
- In single arm mode HMS can be used to measure accurate pair symmetric backgrounds from $\gamma \rightarrow e^+e^-$ pair production.
- For pair background it will detect positrons up to 2.2 GeV/c.
- For the packing fraction it will detect electrons, like it did during RSS, with momenta from 1 to around 5 GeV/c.
- SANE will use HMS in a single arm and coincidence mode.
- SANE will need HMS “standard” configuration, at $\theta_{HMS} = 14^\circ - 48^\circ$.

Parasitic running

- There are interest in using the HMS for inclusive $e + p \rightarrow e' + x$.
- There is a idea to run physics using HMS-BETA in coincidence.

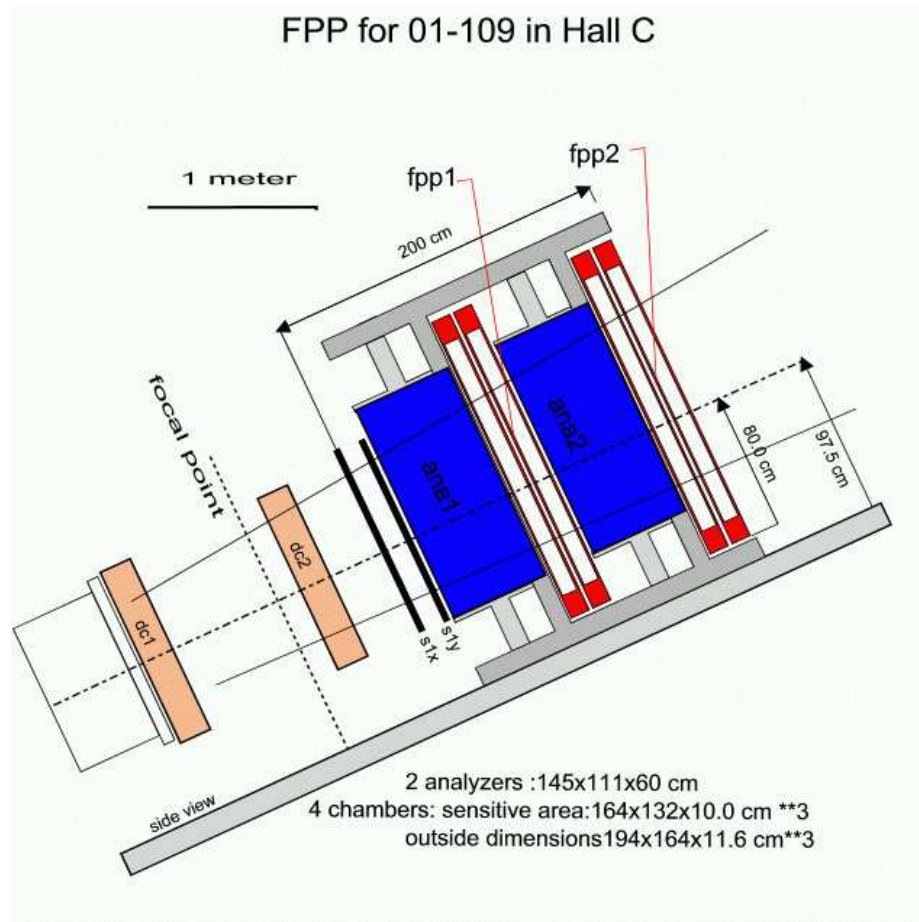
Many of these ideas and possibilities can be tested during Gep-III !

HMS Hut Trigger for Gep-III

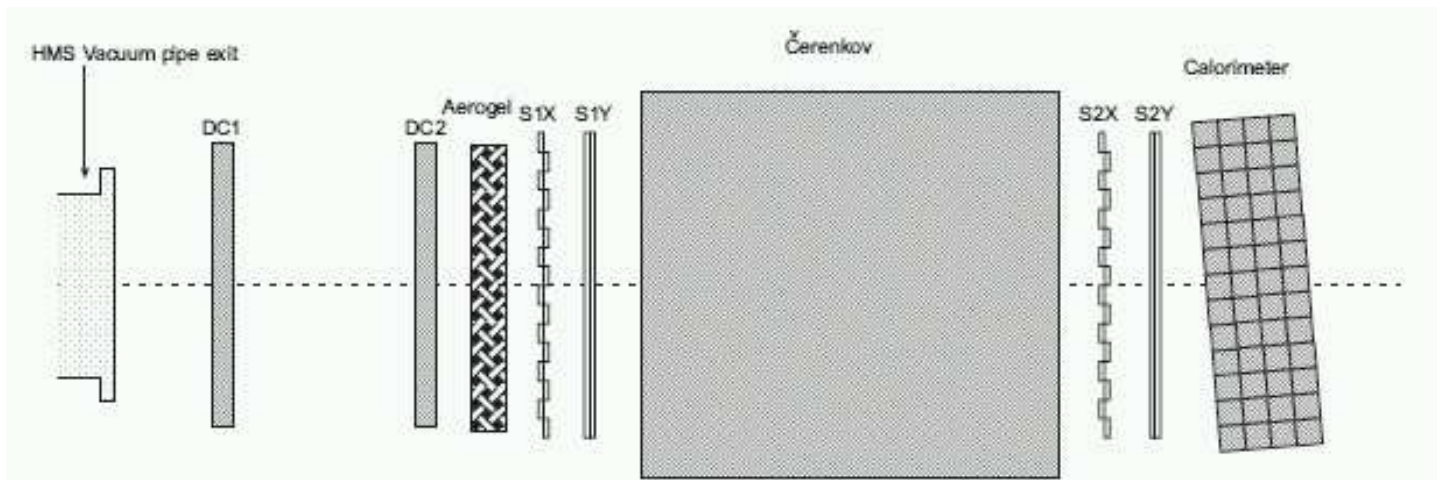


- For Gep need to setup a HMS trigger in the HMS hut.
- For the Gep3 running we will have only the S1 in trigger.
- To use the HMS for SANE ideas during Gep runing:
need to duplicate this for the S2 and make coincidence.

HMS Detector Package for GEP and for SANE



HMS Detector package for Gep



HMS Detector package for SANE

Tasks needed for HMS Reconfiguration

GEP-III → SANE

- Disconnect all cabling;
- Dismount HMS hut concrete wall;
- Dismount and take out FPP and S0 detectors;
- Dismount mechanical supports of FPP and S0 detectors;
- Slide back at nominal position HMS hodoscope plane S1;
- Re-install Aerogel detector;
- Re-install HMS hodoscope plane S2;
- Re-install HMS gas Cerenkov;
- Mount HMS hut concrete wall;
- Restore all cabling, and communication detector-counting house;
- Restore electronic, trigger and DAQ;
- Start cosmic run for detectors checkout.

Time Lines for HMS Reconfiguration

Task	Days	Proposed dates
• Disconnect FPP cabling:	3-4	05/16/08 - 05/20/08
• Uninstall Gep-III FPP:	5-7	05/20/08 - 05/30/08*
• Reinstall base detectors:	7-8	05/30/08 - 06/10/08*
• Restore cabling for HMS detectors:	5-6	06/11/08 - 06/16/08
• HMS single mode Trigger:	3-4	06/17/08 - 06/20/08
• HMS coincidence mode Trigger:	3-4	06/21/08 - 06/23/08
• Cosmic runs for HMS detectors:	5-6	06/24/08 - 06/30/08
• Fix if any problem will found:	5-6	07/01/08 - 07/10/08

* Will need active support and hard work from Walter and his crew !

** Need about 1-1.5 month from the start to have HMS ready for SANE.

Possible Problems:

How in practice we will combine all wishes what we want from HMS during Gep and SANE ?

Could we detect pions during Gep-III ? Probably will be very difficult or impossible. This may preclude some kinds of parasitic running with Gep.