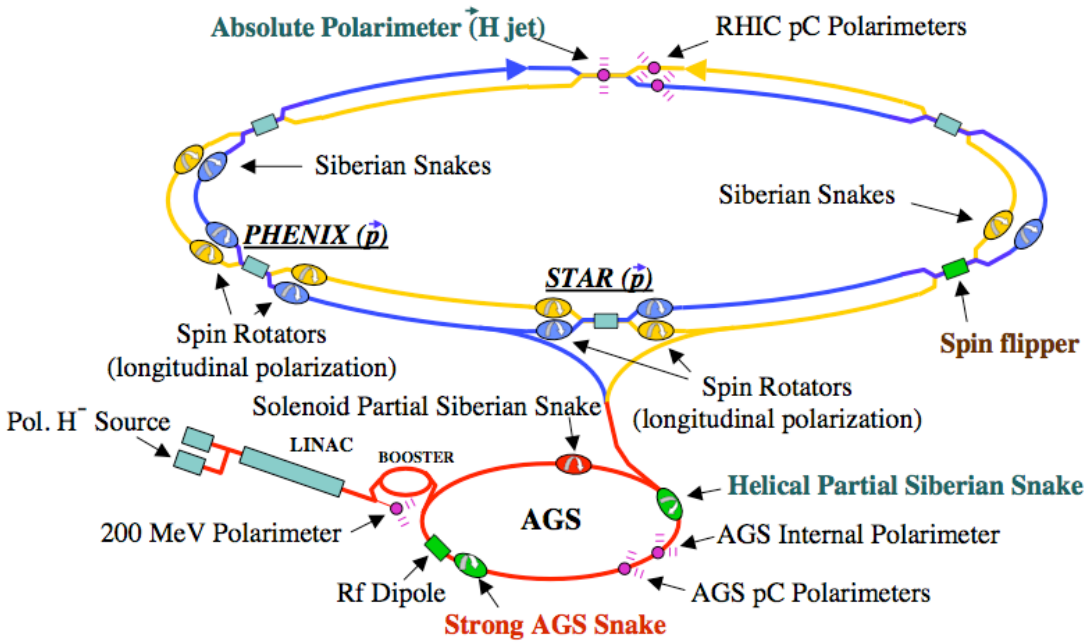
Drell-Yan Production at STAR Status and Plans

Ernst Sichtermann (LBNL)
for the STAR Collaboration



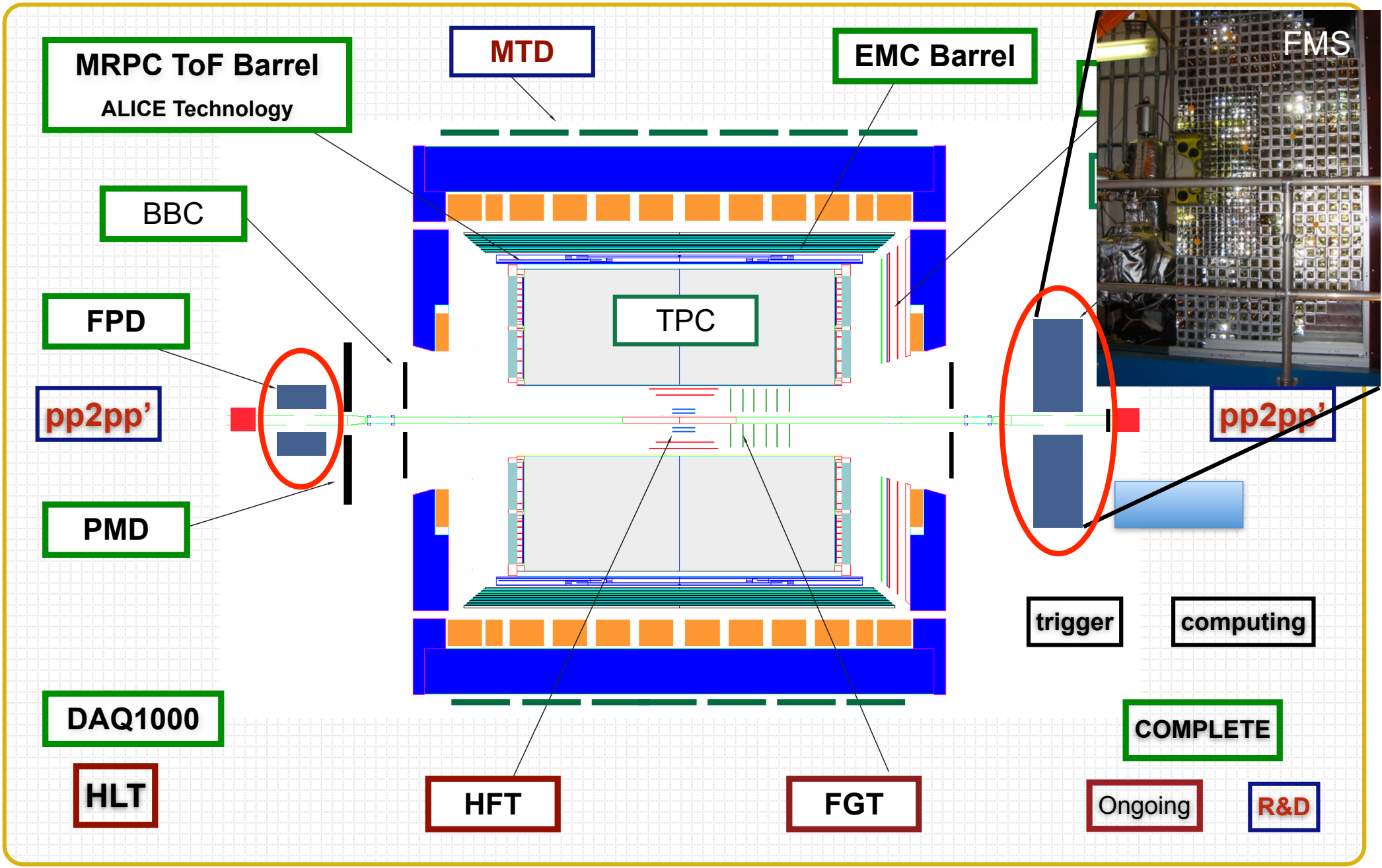
Opportunities for Drell-Yan Physics at RHIC
RIKEN BNL Research Center Workshop
May 11-13, 2011 at Brookhaven National Laboratory

STAR - Summary of Measurement Plan

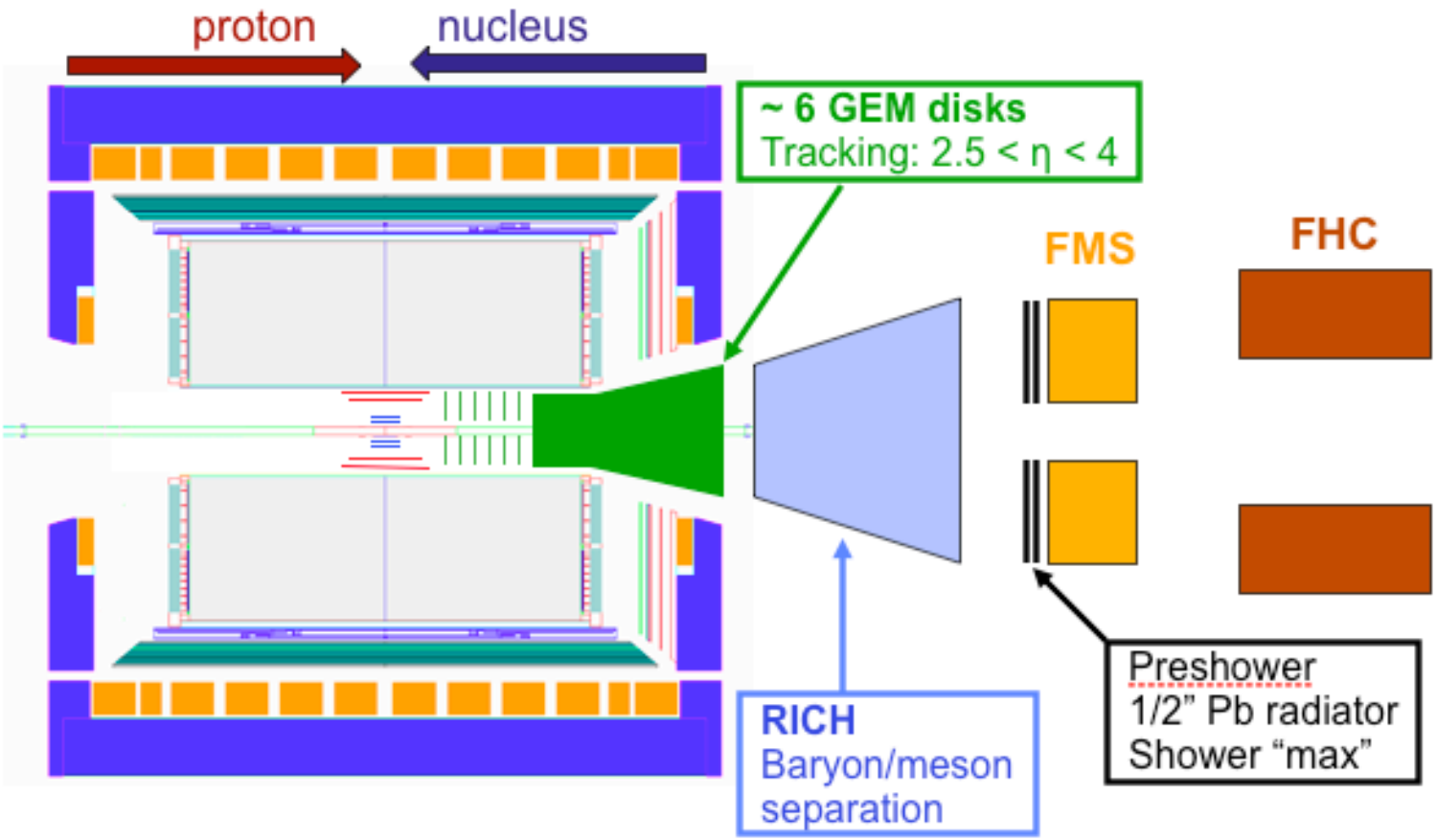
	Near term (Runs 11–13)	Mid-decade (Runs 14–16)	Long term (Runs 17–)
Colliding systems	p+p, A+A	p+p, A+A	p+p, p+A, A+A, e+p, e+A
Upgrades	FGT, FHC, RP, DAQ10K, Trigger	HFT, MTD, Trigger	Forward Instrum, eSTAR, Trigger
(1) Properties of sQGP	Υ, $J/\psi \to ee$, m_{ee}, v_2	Υ, $J/\psi \to \mu\mu$, Charm v_2, R_{CP}, Charm corr, Λ_c/D ratio, μ-atoms	p+A comparison
(2) Mechanism of energy loss	Jets, γ-jet, NPE	Charm, Bottom	Jets in CNM, SIDIS, c/b in CNM
(3) QCD critical point	Fluctuations, correlations, particle ratios	Focused study of critical point region	
(4) Novel symmetries	Azimuthal corr, spectral function	$e-\mu$ corr, $\mu-\mu$ corr	
(5) Exotic particles	Heavy anti-matter, glueballs		
(6) Proton spin structure	W A_L, jet and di-jet A_{LL}, intra-jet corr, $(\Lambda+\bar{\Lambda})$ D_{LL}/D_{TT}		$\bar{\Lambda}$ D_{LL}/D_{TT}, polarized DIS, polarized SIDIS
(7) QCD beyond collinear factorization	Forward A_N		Drell-Yan, F-F corr, polarized SIDIS
(8) Properties of initial state			Charm corr, Drell-Yan, J/ψ, F-F corr, Λ, DIS, SIDIS

STAR Decadal Plan, http://www.bnl.gov/npp

STAR Experiment - Forward Calorimeters



A Possible Future Upgrade at STAR

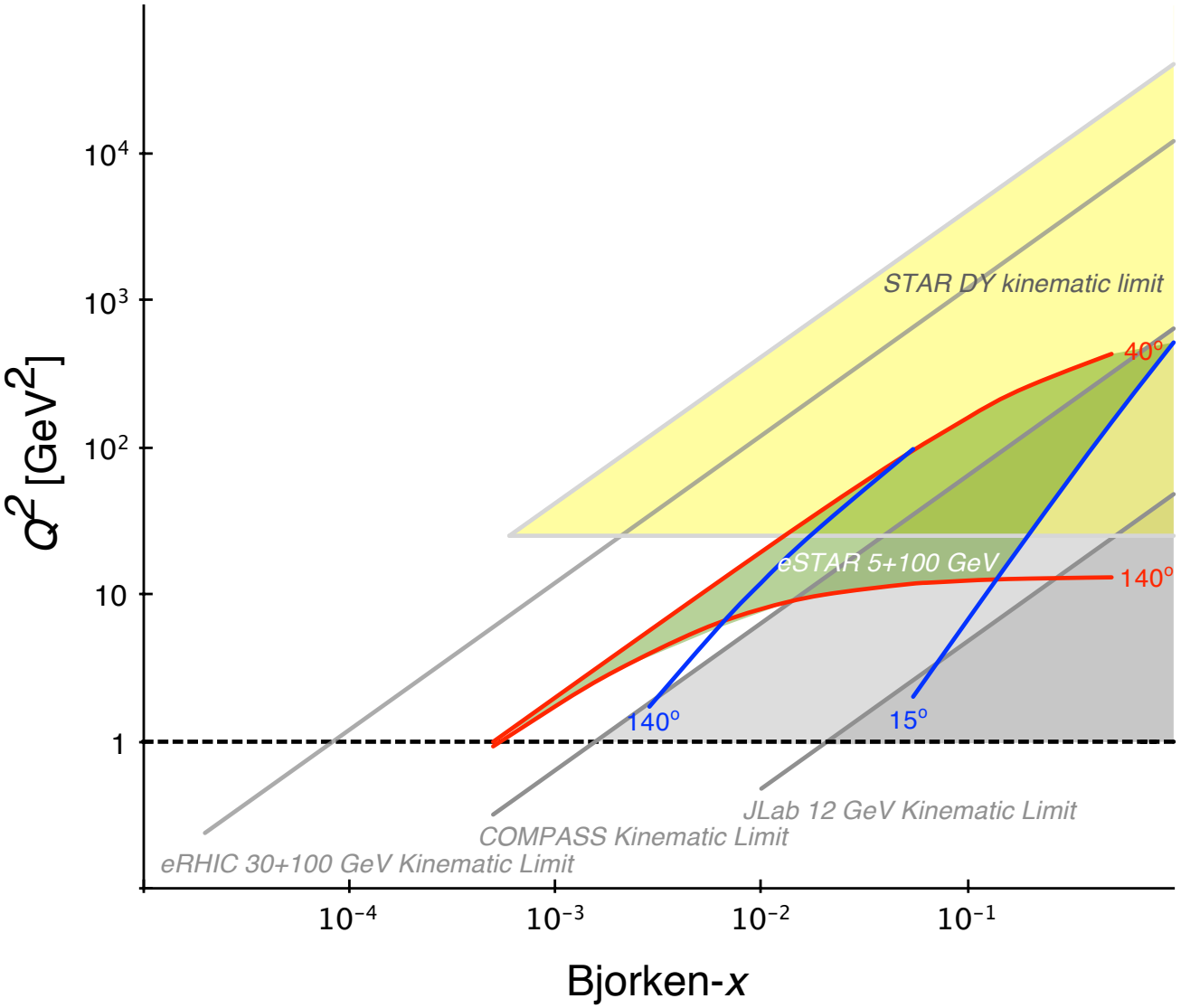


Forward upgrade driven by proton-nucleus and transverse spin physics considerations,

- charged particle tracking,
- electron-hadron and photon-neutral pion separation,
- Baryon meson separation.

Optimizations and full simulations to demonstrate capability are starting.

Drell-Yan, eRHIC, eSTAR



A talk by itself...

Note: this is an *illustration*, not a full simulation.

Here, M > 5 GeV for DY, central-rapidity for eSTAR

Concluding Remarks

STAR has prepared a new decadal plan for 2011-2020, http://www.bnl.gov/npp

Aims to address transverse physics and nuclear structure physics topics via Drell-Yan measurements in the second half of the decade, as part of a broader program that may culminate in an Electron-Ion-Collider,

The Forward Meson Spectrometer is a key part of this program, and has been very successfully commissioned and operated up to $\sqrt{s}$ = 500 GeV,

Anticipate at the level of 150 Drell Yan pairs in the FMS acceptance at $\sqrt{s}$ = 200 GeV, about equal for proton+nucleus and proton+proton collisions, based on RHIC projections,

$\sqrt{s}$ = 500 GeV p+p projected rates are considerably higher, however,
detection at STAR will be considerably more challenging,
p+A collisions are not possible at this energy at RHIC,

Lots of work ahead,

- a number of key aspects are well understood/benchmarked,
- the foreseen upgrade path is evolutionary,
- efforts towards full simulations of measurement capability are starting,
- continued R&D, ...

Thank you!