STAR Overview

Frank Geurts
(Rice University)
for the STAR Collaboration
The Solenoidal Tracker at RHIC

MUON TELESCOPE DETECTOR

BEMC

TOF

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RHIC Runs 14 - 16

- STAR Heavy Flavor Program
  HFT and MTD
  Au+Au, p+p, p+Au @ √s_{NN}=200GeV

Giacomo Contin (254)
Heavy Flavors ... first results from HFT and MTD!!

- Thermalization and modification of charm at RHIC?
  - $D^0, D^\pm$ elliptic flow – Michael Lomnitz (493)
  - $D^0$ nuclear modification factor – Guannan Xie (523)
- Modification of charm in the medium: How about $D_s^{\pm}$? – Md Nasim (221)
  - strangeness enhancement reflected in an enhanced $R_{AA}$ compared to the other $D$'s?
  - effects of expected early freeze-out in a reduced elliptic flow?
- Results from semi-leptonic channels – Xiaozhi Bai (496)
  - new $p+p$ cross section measurements, $R_{AA}$ in Au+Au and U+U
- Quarkonia – suppression, a complicated story ... – Rongrong Ma (274), Barbara Trzeciak (497)
  - measure $J/\psi$ nuclear modification
  - disentangle production/regeneration mechanisms: $J/\psi$ non-zero $v_2$ at low momentum
  - to the bottom of it: explore different $\Upsilon$ states
  - make sure to understand “the basics”: $J/\psi$ and $\Upsilon$ production and polarization in $p+p$

Jets – study energy loss in the medium

- Surface vs. volume emission – Nihar Sahoo (251)
  - compare medium effect for $\gamma_{dir}$-hadron and $\pi^0$-hadron; we do not see less suppression for $\pi^0$-h when compared to $\gamma_{dir}$-h.
  - Push $l_{AA}(z_T)$ measurements to lower $z_T$
- Quantifying medium properties – Peter Jacobs (311)
  - recoil jets suggest less out-of-cone energy transport at RHIC than LHC
New Results for 14.5GeV :: fill in the large $\mu_B$ gap

- Higher moments of net particle distributions: -- Jochen Thaeder (153)
  - new results for net-$Q$, net-$K$, and net-$p$; indications of non-monotonic behavior
- $v_1$ for identified particles -- Prashanth Shanmuganathan (398)
  - study the interplay between baryon transport and hydrodynamic expansion; can theory reproduce this?
- The ridge, $v_2^2$, and $v_3^2$ from di-hadron correlations -- Liao Song (258)
  - apparent non-monotonicity of $v_3^2/v_2^2$ and $v_3^2/n_{ch}$ similar in shape to net-$p$ $dv_1/dy$; 1st order phase transition?
- Bulk properties vs. energy, centrality -- Vipul Bairathi (492), Daniel Brandenburg (606), Chris Flores (320)
  - $v_2$, chemical & kinetic freeze-out
  - energy dependence of strange baryon-meson ratios
  - rapidity density measurements and the Dale plot
- Hadron suppression and nuclear modification
  - centrality dependence of high-$p_T$ suppression-- Stephen Horvat (323)
  - identified particle $R_{CP}$ -- Daniel Brandenburg (606)

Chiral Symmetries

- BES dielectron measurement -- Shuai Yang (290)
  - acceptance corrected, life-time comparison: BES and U+U
- Charge-dependent directed flow in Cu+Au -- Takafumi Niida (263)
  - can asymmetric systems result in large initial electric fields?
  - relevant to test chiral-magnetic effect and waves.

<table>
<thead>
<tr>
<th>$\sqrt{s_{NN}}$ (GeV)</th>
<th>7.7</th>
<th>11.5</th>
<th>14.5</th>
<th>19.6</th>
<th>27</th>
<th>39</th>
</tr>
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<tbody>
<tr>
<td>$\mu_B$ (MeV)</td>
<td>420</td>
<td>315</td>
<td>260</td>
<td>205</td>
<td>155</td>
<td>115</td>
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</tbody>
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STAR Posters

... where you have all the time, and find all the experts!

Chiral Symmetries
- Charge Asymmetry Correlations to Search for Chiral Magnetic Effect from BES (123)
- Systematic searches for chiral magnetic effect and chiral vortical effect (948)

Beam Energy Results
- Net-K results from BES (127)
- Search for critical parton density fluctuations through baryon clustering (103)
- Energy and centrality dependence of identified particle elliptic flow (833)
- Beam Energy Dependence of Deuteron Prod. (130)
- Production of light nuclei (105)
- STAR Au+Au fixed target results (116)

Quarkonia
- Non-Prompt J/ψ Measurements (626)
- J/ψ polarization measurement in p+p collisions at 500 GeV (624)
- Y measurements in p+p collisions at 500 GeV (613)

Open Heavy Flavor
- Two-particle correlation measurement of D⁰ meson elliptic anisotropy (521)
- D₅⁺ meson production in Au+Au collisions (569)
- Λᶜ⁺ baryon production in Au+Au collisions (555)
- Measurements of heavy flavor electron production (567)
- Measuring Charm and Bottom Productions in Semi-leptonic Channels (542)
- Measurement of semileptonic decays of open heavy flavor hadrons in p+p and Au+Au (505)
- Heavy Flavor Triggered Azimuthal Correlations in p+p at 500 GeV (533)

Jets & U+U
- Characterizing the away-side jet, devoid of flow background, via 2-particle and 3-particle correlations (412)
- Strangeness production in U+U (560)
- Electrons from heavy flavor decays in central U+U (517)
STAR Future Plans

Completing the RHIC Mission

- charm
dilepton
sQGP properties

- QCD phase structure
  - Critical Point

HF-I, (e, μ), spin

BES-II

e-Cooling, iTPC, EPD

Forward tracking/calorimetry, HFT+, TPC speed-up

HF-II, p↑A

AA: B, Λ_c, jet, γ-jet, 3D correl.
p↑A: CNM, proton structure


iTPC proposal: drupal.star.bnl.gov/STAR/starnotes/public/sn0619
BES-II whitepaper: drupal.star.bnl.gov/STAR/starnotes/public/sn0598
The STAR Collaboration

5 continents
11 countries
57 institutes
583 collaborators

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http://www.star.bnl.gov/central/collaboration
STAR Speakers & Sessions

Monday
• 11:15a Daniel Brandenburg (606) – Open HF & Strangeness
• 2:30p Jochen Thaeder (153) – Correlations & Fluctuations I
• 3:10p Guannan Xie (523) – Open HF & Strangeness II
• 5:00p Takafumi Niida (263) – Initial State Physics & Approach to Equilibrium

Tuesday (AM)
• 9:00 Michael Lomnitz (493) – Collective Dynamics I
• 9:20 Prashanth Shanmuganathan (398) – Collective Dynamics
• 11:10 Md Nasim (221) – Open HF & Strangeness IV
• 11:30 Nihar Sahoo (251) – Jets & High p_T Hadrons III
• 11:30 Xiaozihi Bai (496) – Open HF & Strangeness IV
• 11:50 Chris Flores (320) – Collective Dynamics II

Tuesday (PM)
• 2:40p Liao Song (258) – Correlations & Fluctuations IV
• 3:00p Peter Jacobs (311) – Jets & High pT Hadrons IV
• 3:00p Giacomo Contin (254) – Future Exp. Fac., Upgr.

Wednesday
• 9:40a Vipul Bairathi (492) - Collective Dynamics III
• 9:40a Barbara Trzeciak (497) – Quarkonia III
• 10:50a Rongrong Ma (274) – Quarkonia IV
• 11:10a Shuai Yang (290) – Electromagnetic Probes II
• 11:50a Steven Horvat (323) – Baryon Rich QCD Matter

Thursday
• 11:30a Mustafa Mustafa (60) – Plenary II