The SBS polarized ^{3}He target:
present status and
plans for this summer

Gordon D. Cates
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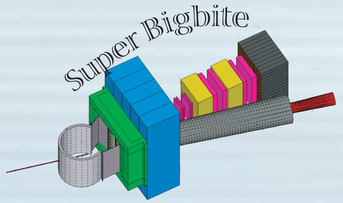

University of Virginia

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EXPLORING THE NATURE OF MATTER

Present status

(polarimetry analysis is ongoing, so take these numbers with a grain of salt)

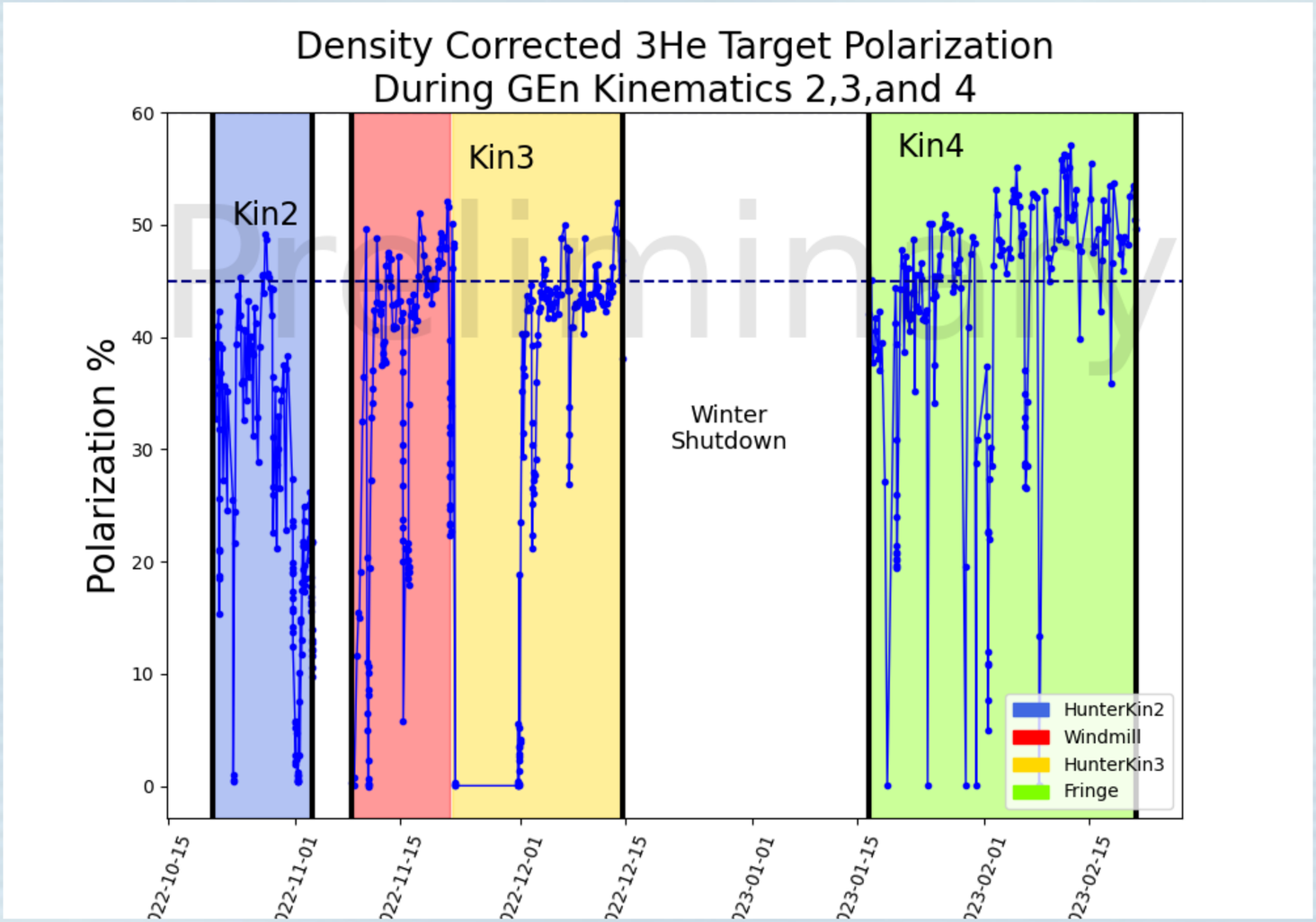
- Chicago currently installed.
  - Accumulated charge: 0.0C (thus far)
  - Polarization up to ~47%
- Quick summary of **all** GEn-II targets to date:
  - Total charge 107.1C (equivalent of 160.7 with 40cm target chamber). Compare with total charge during A1n & d2n of 73.4 C)
  - Typical polarizations: ~35% Kin2, ~45% Kin3 and ~54% Kin4
  - Figure of merit compared to nominal A1n value (assuming A1n was 50% with 30μA): Ratio = 1.1 Kin2, 1.8 Kin3 and 2.6 Kin4.

Target cells that have seen* beam

Cell name	Kinematic configuration	Estimated max polarization	Accumulated charge	Comments
Ukraine	Kin1	—	0.0C ?	Strictly for target shakedown.
Hunter	Kin2	Up to ~47%	13.5C	
Windmill	Kin3	Up to ~52%	20.9C	Ruptured, likely due to target misalignment and excessive spot size
Hunter	Kin3	Up to ~50%	27.7C (41.2C Kin 2&3)	Ruptured due to beam missteering.
Fringe	Kin4	Up to ~58%	45.0C	
Chicago	Kin4	Up to ~47%	0.0C ?	Unlikely to see more than 12-23 C, if that, but the end of run period.

*By "seen", I mean only the target has been installed while there was beam, even if not beam was actually put on the target itself.

Polarized 3He target performance during the run



For reference - with the 60cm target chamber, a polarization of 45% and 45μA of beam, the figure-of-merit compared to A1n (assumed to be 50% with 30μA beam) is x 1.82 higher.

Preparation for the summer/fall run

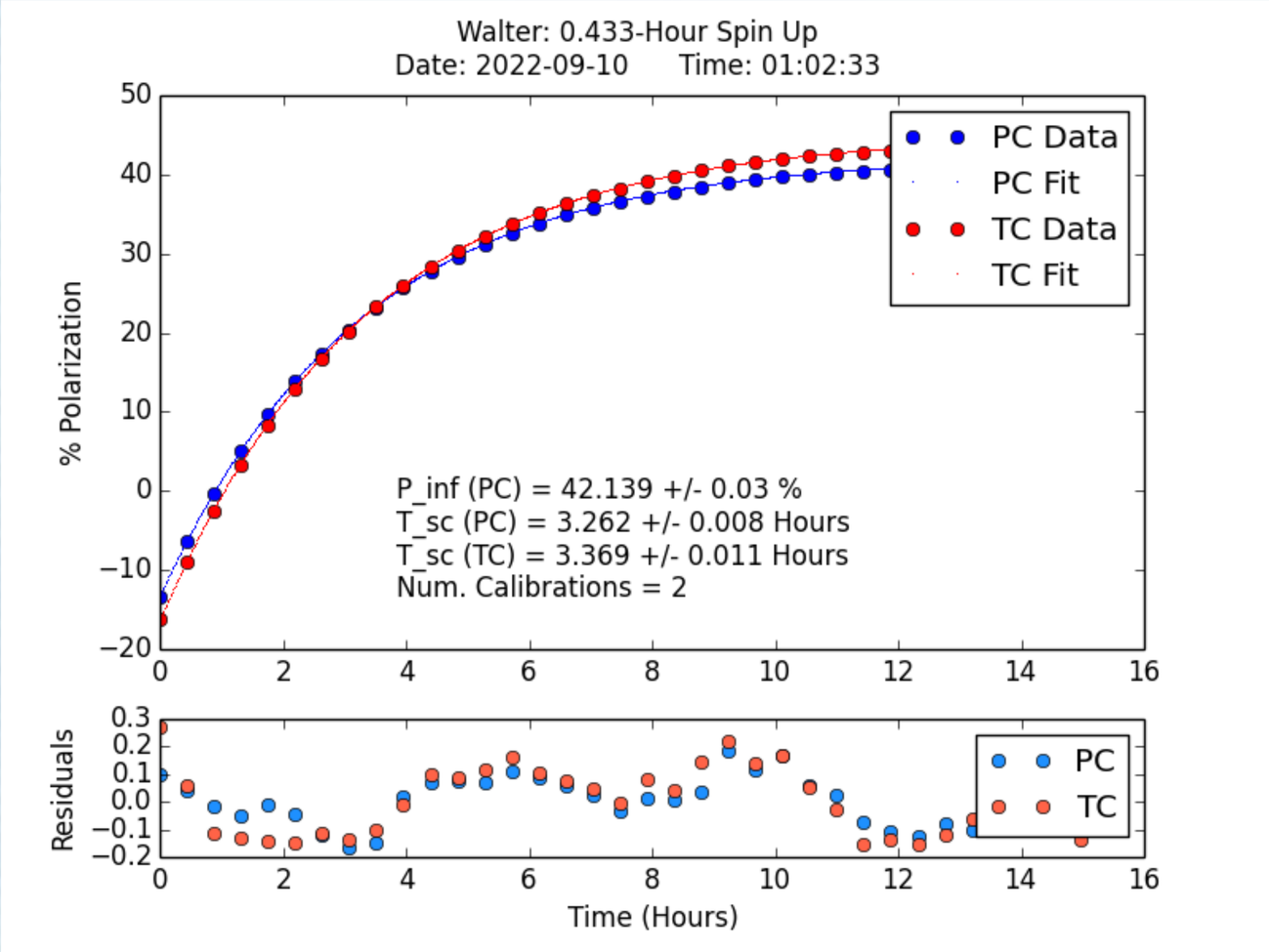
- At JLab:
  - Insuring sufficient numbers of optical fibers to the laser room.
  - Mounting and testing upcoming target cells in the actual target.
  - Explore optimal configuration for A_LL
- At UVa
  - Further testing of existing target-cell inventory.
  - Producing 4-5 additional target cells out of Corning 1720.
  - Testing of new 1720 target cells

Existing target inventory

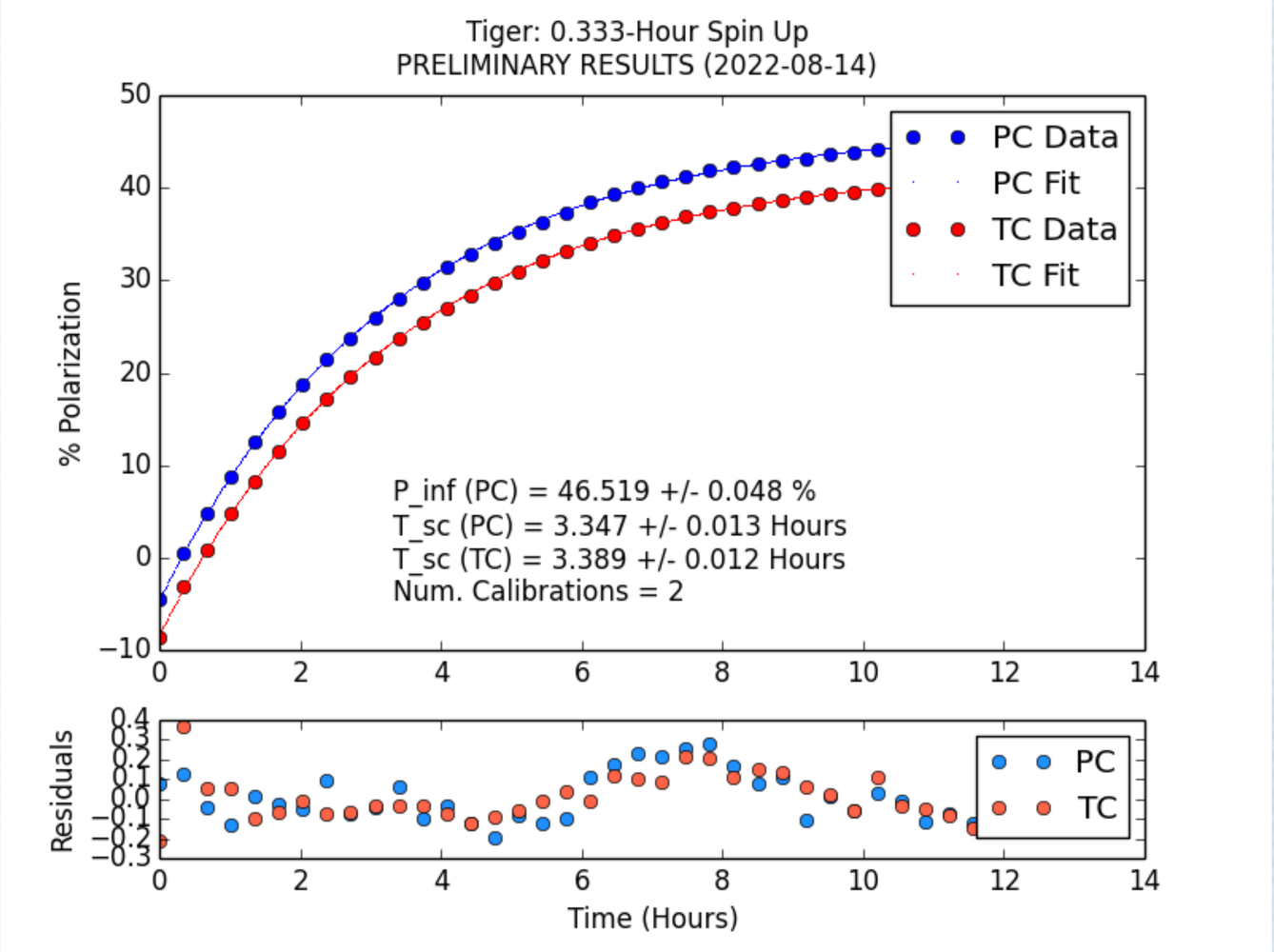
Cell name	Fill Date	Outcome	T1 (PC/TC)	Material	Comments
Tiger	May 26, 2022	46.5% during simulated beam test @ 60μA	9.8 hrs / 19.6 hrs	GE-180	(Measured in longitudinal field configuration)
Walter	August 16, 2022	42.1% during simulated beam test @ 60μA	11.2 hrs w conv.	GE-180	(Measured in longitudinal field configuration)
Chicago	Nov. 10, 2022	47% at JLab	8.1 hrs / 15.3 hrs	GE-180	Will likely have less than 23C of charge after current running period
Mekong	Nov. 27, 20223	—	13.3 hrs / 16.3 hrs	GE-180	—
No-name	Est. late March	—		Corning-1720	Exists, although we want to replace the pumping chamber for a new one.

Expect to make 4-5 additional target cells out of Corning 1720 for the summer/fall run.

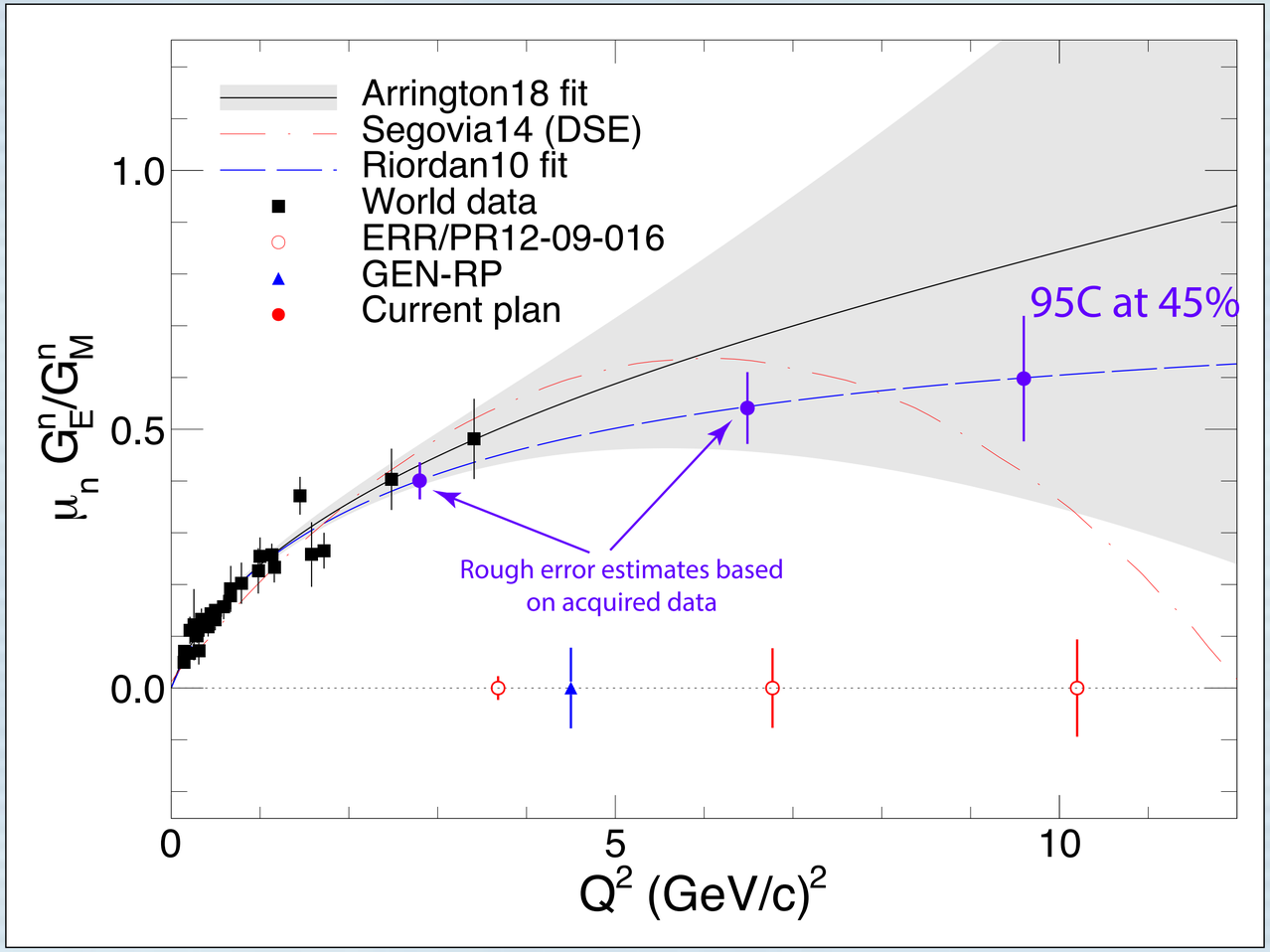
Simulated beam test of Walter



Simulated beam test of Tiger



Error projections



For Kin4, we presently have roughly 55C (corrected). We have a reasonable shot at getting another 70C (corrected) in the summer/fall run, possibly 80-90C. It would be a huge help if we could get another 12-15 C before the SAD. The ERR Kin4 point shown above assumes 157C.