



Irfu

Institut de recherche
sur les lois fondamentales
de l'Univers

**SOUTHERN
GAMMA-RAY
SURVEY
OBSERVATORY**

**SCIENCE CASE FOR A WIDE FIELD-OF-VIEW
VERY-HIGH-ENERGY GAMMA-RAY OBSERVATORY IN THE
SOUTHERN HEMISPHERE**

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RUIZHI YANG, AND YOUR NAME CAN BE HERE...

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Review of the white paper

[https://v1.overleaf.com/
9778425nsxphywwjcmj](https://v1.overleaf.com/9778425nsxphywwjcmj)

[https://www.sgso-alliance.org/
SGSOWiki/doku.php?
id=white_paper](https://www.sgso-alliance.org/SGSOWiki/doku.php?id=white_paper)

Fabian Schüssler

Reviewers



- **Stefan Funk + Marianne Lemoine-Gourmard**
 - Section 3 "Unveiling Galactic Particle Accelerators"
- **Markus Böttcher**
 - Section 4 "Monitoring the Transient Sky" (focussing on AGNs)
- **Marcos Santander**
 - Section 4 "Monitoring the Transient Sky" (focussing on MWL/MM)
- **Pat Harding**
 - Section 5 "Probing Physics Beyond the Standard Model"
- **Andreas Haungs**
 - Section 6 "Cosmic-ray observations"
- **Gavin Rowell**
 - Sections 1, 2 and 7 "Introduction", "Context" and "Design considerations"

General comments

- **Need estimate of angular resolution**
 - crucial for Galactic sources, but relevant almost everywhere
- **Sensitivity figure(s) should be shown in the introduction**
- **Comparison with CTA**
 - it is not always obvious why and how SGSO can do better than CTA (e.g. individual Galactic sources, molecular clouds, etc.)
 - If SGSO is better than IACTs, then say why/how and to what result SGSO can do. Don't just say that the IACTs can't do this or that...

Unveiling Galactic Particle Accelerators

■ Pevatrons

- sensitivity to extended sources is additional driver (e.g. SNR G150.3+4.5 with hard spectrum in Fermi-LAT)
- discuss unidentified sources like HESS J1641-463, J1741-302 and J1826-130
- maybe re-organise: Pevatrons as general concept

■ LMC

- no cut-off detected by H.E.S.S. in SRN N132D
- superbubble 30 Doradus C

■ PWNe

- extend discussion, e.g. complementarity and input to CTA
- many HAWC high-E sources in coincidence with PWNe
- e.g. implications for the CRs in the Galaxy

■ Diffuse emission + Fermi bubbles

- Add diffuse Galactic emission as observation (not only as background)?
- Why is SGSO suited for this despite its relatively poor angular resolution?
- Quantify Fermi-bubble studies

Monitoring the Transient Sky

- **Focus on what SGSO can do that other can't**
 - focus on low energy performance (not the lack of events at high E)
 - large redshifts would be good for EBL studies (not "too distant to be detected")
- **Be precise, explain how SGSO would do the analyses**
 - don't use standard phrase (e.g. "we need population studies to understand particle acceleration", etc.)
 - How will SGSO improve over HAWC (only 2 detected EGAL sources)?
 - What does the "unbiased survey" bring for the physics
 - more examples: how would known light-curves look like, how many flares can be expected (Fermi extrapolations?), etc.
- **finalize the missing subsections or remove them**
 - also reduce length for topics that are challenging for SGSO (or provide more details on advantages over CTA, e.g. EBL studies)
- **more details for GRB detections and neutrino follow-up**

Probing physics beyond the Standard Model

- **SGSO DM sensitivity should be compared to existing limits and projected CTA sensitivity**
- **How do the different systematics between SGSO and CTA influence the results?**
- **Worse PSF => less sensitive to differences in DM profiles**
- **Emphasize the possibility to analyze newly found objects (e.g. dSph)**

Cosmic rays

- **Do we really need a 0.5 km² array to be competitive?**
 - What can we learn with an array of the straw man layout?
- **Quantify the electron spectrum measurement? Range? Uncertainty?**
- **What about the electron anisotropy?**
- **Highlight that SGSO will cover an interesting RA and energy range (sharp transition between 10 and 200 TeV)**
- **HAWC CR spectrum does not agree with other measurement: discuss**
- **Elaborate on EAS model studies**
- **Wording could be more precise/careful**
 - the knee as end of the Galactic CRs is not a fact (e.g. "component B")
 - define "standard picture of CRs"

Summary and next steps

- Finalize the missing sub-sections
 - timescale?
 - do we need to focus on the main/crucial points?
- Go through the comments
 - dedicated sub-group meetings (inviting the referees)
 - distribution of work ("who is doing what")
 - update the draft

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- Authorlist
 - Opt-out (by default all SGSO members)?
 - Opt-in (open to all SGSO members)?
- Journal submission? Or only arXiv?
 - Which journal?
- Start work on Decadal survey paper(s)