

CYGNO paper to be submitted:

Noise assessment of CMOS Active Pixel sensors

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CYGNO general meeting

Noise assessment of CMOS Active Pixel sensors for the CYGNO Experiment

- Reviewed by Pubcomm selected reviewers
- Shared with the whole Collaboration
- **Presentation before final submission**

Contents

1. Introduction

2. Measurement setup

2.1 Detection system

2.2 Acquisitions and datasets

3. Results

3.1 Sensors sensitivity using a radioactive source

3.2 Read noise and Spatial Non-uniformities

3.2.1 Overall characteristics

3.2.2 Regions characteristics

3.3 Telegraph noise

3.4 Fake clusters

4. Summary

| | Pixel size ($\mu\text{m} \times \mu\text{m}$) | Matrix size | Peak QE (%) | Read noise (electrons) | Dark current (electrons/pixel/s) |
|-----------|--|--------------------|----------------|---------------------------|-------------------------------------|
| FLASH | 6.5 \times 6.5 | 2048 \times 2048 | 82 | 1.4 ^{*1} | 0.06 |
| FUSION | 6.5 \times 6.5 | 2304 \times 2304 | 80 | 0.7 ^{*2} | 0.5 |
| BSI Prime | 6.5 \times 6.5 | 2048 \times 2048 | 95 | 1.1 and 1.8 ^{*3} | 0.5 |

Journals

Prepared for the DDBSCAN paper

▷ **Journal of instrumentation (JINST):**

○ **Impact factor: 1.121; Cite score: 2.4**

- Stability and detection performance of a GEM-based Optical Readout TPC with He/CF₄ gas mixtures (2020)
- First evidence of luminescence in a He/CF₄ gas mixture induced by non-ionizing electrons (2020)
- A density-based clustering algorithm for the CYGNO data analysis (2020)

▷ **Nuclear Instruments and Methods in Physics Research - section A (NIM-A):**

○ **Impact factor: 1.335; Cite score: 3.1**

- Performance of an optically read out time projection chamber with ultra-relativistic electrons (2021)
- 50 litres TPC with sCMOS-based optical readout for the CYGNO project (2023)

▷ **Measurement Science and Technology (Meas. Sci. Technol.):**

○ **Impact factor: 2.398; Cite score: 3.7**

- Identification of low energy nuclear recoils in a gas time projection chamber with optical readout (2021)

Journals

Prepared for the DDBSCAN paper

▷ **IEEE Transactions on Nuclear Science**

- **Impact factor: 1.703; Cite score: 3.5**
 - It has publications in the area of particle physics and instrumentation.

▷ **IEEE Transactions on Instrumentation and Measurement**

- **Impact factor: 5.332; Cite score: 5.9**
 - It has a scope similar to the previous journals.
 - Despite not publishing a lot about particle physics, it has topics that match the paper idea: Computer Vision and Image Processing for Instrumentation and Measurement; Signal Processing and Artificial Intelligence for Instrumentation and Measurement.

Additional comments



Some usual informations asked by the Journal:

- ▶ **ORCID for all the authors**
 - IEEE journal → required
 - Meas. Sci. Techno → recommended
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