

Ph.D. Project Roadmap: DMAG-8T Axion Search

SECTION 1: Strategic Achievements & Setup

Autonomous DAQ System Implementation: Fully migrated from legacy SA-based acquisition to a **Digitizer-based** system for optimized data integration.

JPA Optimization Logic: Implemented automated **JPA re-optimization every 5 runs** to maintain minimum T_{sys} and ensure peak sensitivity.

Real-time Monitoring Infrastructure: Developed a **new high-performance MySQL/Grafana dashboard** to overcome the latency issues of the legacy system and ensure stable monitoring.

High-Q HTS Cavity: Achieved $Q_0 \approx 2.0 \times 10^5$ at 8T / 50mK (3× enhancement over Copper).

Operational Efficiency: Reached **90% time efficiency** (1.2 → 1.5 MHz/day) via tuning rod auto-recovery algorithms.

SECTION 2: Current DAQ Status & Projection (As of 2026.02.10)

Progress: Started 2025.12.25; 3.833 → 3.779 GHz scanned (54.32 MHz)

Goal: Full 300 MHz coverage (3.7 ~ 4.0 GHz)

Phase	Frequency Range	Scenario A (1.5 MHz/day, Optimal)	Scenario B (1.2 MHz/day, Conservative)
Part 1	3.779 → 3.700 GHz	End: April 4	End: April 17
Part 2	4.000 → 3.834 GHz	End: July 27	End: Sept 5
Status	Full 300 MHz	Target: Late July	Target: Early Sept

SECTION 3: Integrated Academic Roadmap (2025.12 – 2027.02)

