Recruitment and Retention of Students and Early-Stage Investigators—*Using Generalized Adversarial Networks to ensure trusted science results and maximize science reach within the dark matter community*

The proposed work includes funding for two Master's students, one responsible for the physics application and one responsible for artificial-intelligence methodology. PI Roberts and Co-PI Banaei-Kashani have recruitment policies that are designed to provide equitable access to the research opportunities in their labs. The cornerstone of these policies are

- Pay close to market rate
- Recruit based on a truly minimal set of requirements
- Provide excellent and complete onboarding activities

The goal of the mentoring plan is to provide the skills, knowledge, and experiences necessary to prepare these early-stage investigators to excel in their chosen career path. Specific elements of the plan will include:

Orientation in Roberts' lab consists of projects to reproduce previous work by following existing documentation and improving the documentation. Both PIs hold frequent meetings with new lab members and use a variety of methods (instant-message server, partnering with other students, multiple check-in meetings per week) to ensure that their work is not blocked by frustrating knowledge and/or documentation gaps.

Career Counseling: will be provided in part by PIs Roberts and Co-PI Banaei-Kashani. Their main roles will be to facilitate frequent discussions about career planning and help identify career-counseling resources that meet the needs of the postdoc. All participating early-career scientists will be encouraged to attend appropriate local conferences, workshops, and job fairs.

PI Roberts has experience in academic careers in physics and research software engineering, and Co-PI Banaei-Kashani has complementary experience in academic and industry careers in computer science.

Publications, presentations, and software releases are expected to result from the work supported by the grant. These will be prepared under the direction of PI Roberts and in collaboration with researchers on this grant and from collaborations such as the Cryogenic Dark Matter Search. Students will receive guidance and training in the preparation of manuscripts for scientific journals, presentations at conferences, and code release and packaging.

Teaching and mentoring skills will be developed in the group through frequent interaction with undergraduate researchers at CU Denver and interaction with graduate students and other early-career scientists in the CDMS collaboration. Both PIs hold frequent "working meetings" with students; all group members attend these and (1) get exposure to different mentoring and working styles and (2) practice describing technical work to a novice audience.

Leadership and collaboration The proposed work requires extensive collaboration with scientists from the SuperCDMS collaboration. PI Roberts helps students develop autonomy within this environment by (1) helping them develop direct relationships with people in the collaboration and (2) helping them understand their role in the scientific output of the collaboration and how to effectively advocate for their efforts.

Lab graduates Both PI Roberts and Co-PI Banaei-Kashani have seen lab members excel in academics and move on to outstanding career options. Below is a full list of post-graduate lab members that have moved on. Mid-degree undergraduate students are not included.

Table 1: Student and early-career researcher pathways in PI Roberts' and Co-PI Banaei-Kashani's lab. PI Roberts is requesting funding for an MIS student in this proposal in part because others in the physics department have seen success at recruiting outstanding students from a wide variety of backgrounds.

Lab title and last-known position	Mentor
Undergraduate Research Assistant, CS Doctoral student	Roberts
Undergraduate Research Assistant, lab instructor	Roberts
Undergraduate Research Assistant, currently applying for mechanical engineering jobs in industry	Roberts
Undergraduate Research Assistant, Master's of Integrated Sciences (not Roberts' lab)	Roberts
Undergraduate Research Assistant, Master's of Integrated Sciences (not Roberts' lab)	Roberts
Undergraduate Research Assistant, Professional Research Assistant in Biostatistics	Roberts
Professional Research Assistant, IT security team at national lab	Roberts
Professional Research Assistant, CSGrad4US NSF Fellowship awardee, CS Doctoral student	Roberts
Master's of Integrated Sciences student, currently applying for jobs in industry	Roberts