

## University of Kansas QuarkNet Center

### Summer 2017 report

The University of Kansas QuarkNet center hosted a summer research program for high school students and a two-day workshop for high school physics teachers.

Prof. Dave Besson was the mentor and organizers of the summer research program. Jim Deane from Ottawa High School (in Ottawa, Kansas) was our research teacher again this summer and played a crucial role in keeping everything on track. Prof. Alice Bean helped with projects and supervision.

We had a record number of applicants (50) for the student positions and about half were selected to be interviewed. The students came from a broader geographic area than before as well. The summer program started on June 12 with an orientation meeting where students were matched with projects. Radio detection of lightning, Quarked! game development (see [www.quarked.org](http://www.quarked.org)), and optimizing cosmic ray detectors were among the topics. Most of the students participated in a field trip to Chicago June 26 through 29. The students toured Fermilab and the sites of Chicago during their four-day trip. Each Friday the whole group met for a pizza lunch and for talks about physics. On July 27 and 28, the student research teams gave presentations on their results. Videos were made of the presentations and all of their data were archived. A photo of part of this summer's research team is presented below.

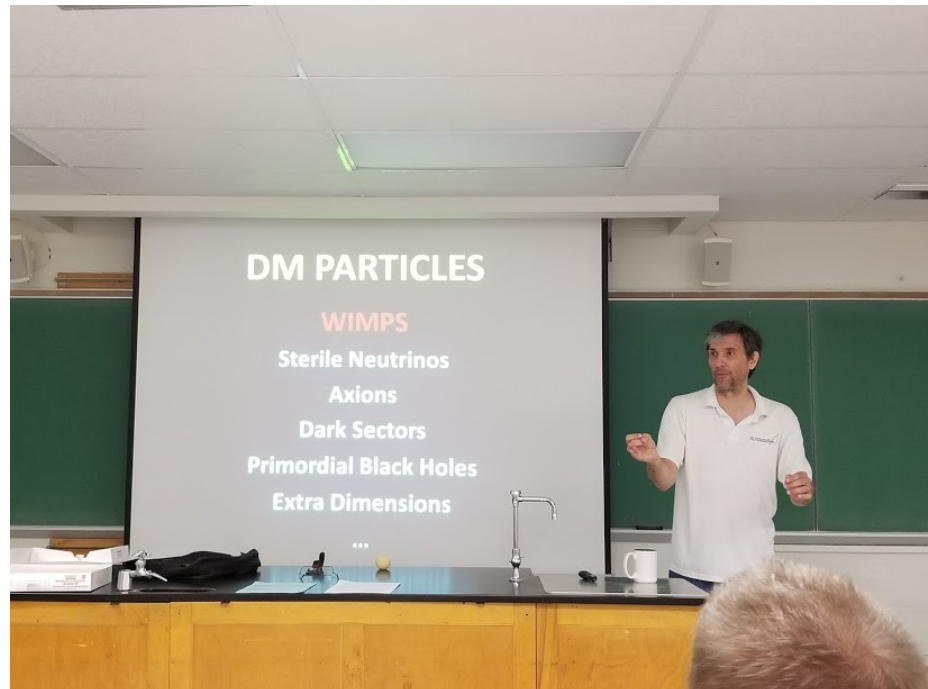
Our workshop for area high school physics teachers was held on August 3 and 4. Prof. Phil Baringer organized the workshop along the theme of dark matter. The first day was devoted to the astrophysical evidence for dark matter with KU astronomer Bruce Twarog presenting the evidence on the morning of August 3 (seen in the photo below). The second day focused on searches for dark matter particles. The teachers developed plans for using this science in their courses and gave presentations. The full agenda for the meeting is appended below. Teachers participating in this summer's workshop were Jake Burkholder, Jim Deane, Miles Martin, John Olson, Matthew Peterie, Theresa Rudnick, and Rod Smith.

Research teacher Jim Deane participated in the solar eclipse study on August 21, taking cosmic ray data before and during totality in northeast Kansas.



## 2017 KU QuarkNet Research Team

Left to Right: Brittany Crossen, Jasmine Thevarajoo, Jim Deane (Research Teacher), Jordan Vonderbrink, Rafael Alaras, Craig Koch, Logan Logback, Brady Volkmann, Jordan Love, Emma Ralston (Grad Student).  
Not pictured: Madison Orlowski, Jaylen Scruggs, Stephen Schuler, Deven Pandya, Ryan Simeon, Jonah Stiel, Cole Brabec



**Addendum: Agenda for the teacher workshop**

**KU QuarkNet workshop 2017**

*Thursday August 3*

**09:00 Coffee, Registration**

**09:15 Introduction/Objectives**

**09:45 Break**

**10:00 Presentation on astrophysical evidence for dark matter: Prof. Bruce Twarog**

**11:30 Preparation for afternoon activities**

**12:00 Lunch**

**13:00 Group exploration: gravity and dark matter for the classroom**

**14:15 Break**

**14:30 Presentations from the groups**

**15:30 Introduction to searches for dark matter**

**16:00 End of Day**

*Friday August 4*

**09:00** Introduction to day's activities

**09:15** Presentation on searches for dark matter particles: Prof. Phil Baringer

**10:15** Break

**10:30** Brainstorming on research topics

**12:00** Lunch

**13:00** Group exploration: searches for dark matter

**14:15** Break

**14:30** Presentations from the groups

**15:30** Reflections and discussion

**16:00** End of workshop