

Reinforcing SULI: How Graduate Students and Sports Improve the Internship

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Abstract

The SULI internship is currently among the best recruiting tools that plasma physics has in the United States. As the interns rush through a crash-course in PPPL research and culture during their ten-week program, it is crucial that the lab provides for a positive experience in all accessible ways.

We overview a sports project undertaken in summer 2016 for the benefit of both summer interns and graduate students. Students opted in to the *PPPL Ping-Pong League*, for which they received a ranking in relation to other players and had the opportunity to play in the 2016 Summer Classic tournament. We also include survey results as a measure of ping pong's impact on the SULI experience.

What impacts the well-being of SULI students?

- ▶ Attraction to plasma physics
- ▶ Research progress and lessons
- ▶ Advisor-mentor relationship
- ▶ Familiarity with life in graduate school/beyond
- ▶ Housing
- ▶ Transportation
- ▶ Attitude toward Princeton/New Jersey

The **highlighted items above** are open to improvement by graduate student involvement in SULI.

Graduate students are the most relatable members of the PPPL community for interns

We have *recent* experience with pertinent problems:

- ▶ Applying to PhD programs
- ▶ Taking the Physics GRE
- ▶ Not being familiar with plasma physics
- ▶ Occupying time in Princeton

Claim

Any interaction between interns and PhD students, official or otherwise, enhances the SULI experience holistically.

Ping-pong as an integrator

- ▶ Graduate students have a well-developed culture of sport
- ▶ Players and spectators gain from "around the water cooler" conversation
- ▶ Competition strengthens one-on-one relationships and encourages interns to reach out to us as mentors

With *23 graduate students and 20 interns* enrolled in the system, the ping-pong league is among the best networks in the lab for integrating these two groups.

Tools for bettering the league: Rankings

- ▶ Official USATT algorithm for ranking players was derived in *The Statistician* by Marcus (2001)
- ▶ Brought to PPPL by Peter Bolgert
- ▶ Updating rankings involves the convolution of players' rankings, represented by Gaussian distributions \mathcal{L}

Updating rankings for player P for W wins and L losses against Q :

$$U(p) = \sum_q \pi(q-p)^W (p-q)^L \mathcal{L}_Q(q) \mathcal{L}_P(p), \quad p, q \in [0, 3600].$$

Scheme for updating rankings

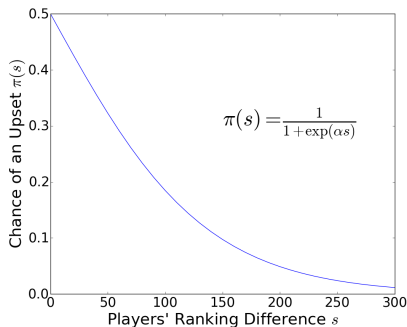


Figure: Odds of an upset between two players with ranking difference s .

- ▶ Ranking website hosted on a Princeton CPanel server
- ▶ All scores stored in a MySQL database
- ▶ Python code incorporates all matches played on a given day/week to adjust players' scores

Second Annual PPPL Summer Classic motivates unusual matchups and widespread spectating

- ▶ Bracket organized on Challonge.com
- ▶ Seeds determined by ranking on July 15
- ▶ Based on a double-elimination bracket until the semifinals



Figure: Hongxuan and Noah play the final in a room filled with spectators.

Survey quantifies impact of SULI's different aspects

Eleven interns completed the survey, substantial but not enough to make claims of correlation

Recurring themes:

- ▶ Working with graduate students is extremely helpful
- ▶ Student-project mismatches are somewhat common
- ▶ Housing/lack of AC/distance from PPPL

Quotes

"I enjoyed talking with the grad students a lot; I would love more social events with them"

"I regret not participating in softball and ping pong (I opted out because I'm not good at either)"

Conclusions and strategies for a better SULI

The goals of SULI should be:

- ▶ Introduce students to plasma physics and research
- ▶ Build interns' networks for future use (graduate applications, etc.)
- ▶ Create an environment where interns can ask questions and explore their options for graduate school/careers

Graduate student involvement is an easy way to dramatically improve the internship. The undergraduates must be made aware of the opportunities (official and otherwise) awaiting them at PPPL.