REU opportunity in applied mathematics for summer 2016 in Alaska

The summer 2016 Research Experience for Undergraduates (REU) program in Fairbanks, Alaska will focus on the mathematical modeling of tsunami waves. You can read about tsunamis here: http://ngm.nationalgeographic.com/2012/02/tsunami/folger-text/1

You can also watch some rare footage of the recent Japan tsunami here: http://video.nationalgeographic.com/video/news/environment-news/japan-tsunami-2011-vin/

Tsunamis are typically generated by either the motion of tectonic plates or landslides. Tectonic tsunamis are the most common and can cause devastating destruction. (e.g., the 2011 Japan and 2004 Sumatra events). Landslides can also generate noticeable tsunamis such as the one in Lituya Bay, Alaska in 1958 that produced a wave that surged 1,700 feet up a hillside.

While it is nearly impossible to be an eyewitness to a real tsunami - you literally have to be in the wrong place at the wrong time -- the REU program participants will, in fact, have a rare opportunity to watch this unique phenomenon in action. A field trip to observe a tidal bore wave, which is produced by the gravitational pull of the Moon or a partial collapse of a glacier front into the sea. While the magnitude of these phenomena is not as large as that of catastrophic events, it is a fascinating event and its occurrence is quite predictable.

Both pictures present a mini tsunami. That is, their nature is the same as that of a tsunami but on a much smaller scale. The one on the left is a bore wave in the Turn Again Arm near Anchorage, Alaska. The one on the right is due to glacier calving near Cordova, Alaska.
Tsunami waves are modeled by nonlinear partial differential equations and the most important issues are their formation, propagation, and the flooding that they cause. From the mathematical point of view, it is a very challenging equation to deal with and to analyze it a large bulk of diverse mathematics should be employed. Our approach will connect a tsunami wave and quantum mechanics and participants will be able to learn and use a variety of mathematics from different areas.

This program is supported by a supplement to an NSF research grant. I intend to offer up to four two month summer scholarships. The stipend amount is competitive. Lodging and travel expenses will be covered for out-of-state participants. The field trip to watch bore waves in the Turnagain Arm will also be paid for.

**Program Requirements and application procedure**

In order to be considered for the REU internship, you must meet the following criteria:

1. Be a citizen or permanent resident of the United States.
2. Be an undergraduate student majoring in mathematics or a closely related field.

**Prerequisites:**

1. Active interest in the topic of the program.
2. Active status of an undergraduate student during the program.
4. Desired qualifications: previous exposure to partial differential equations, numerical analysis, and computer programming. Active knowledge of MATLAB is particularly desirable. Any other skills related to the project (e.g. background in hydrodynamics and/or physics) are also valuable.

To originate the application process, please send an email message to Dr. Alexei Rybkin at arybkin@alaska.edu with a cover letter, your resume (which includes contact information of at least three references), and transcripts attached. Your cover letter should specifically address why the internship appeals to you, your background in mathematics and how you can be an asset to the program, and your career goals.

There is no formal deadline. Applications will be considered as they are received and offers may be extended as soon as well-qualified candidates are identified. The anticipated start of the program is mid-June. Minority students are particularly encouraged to apply.

Please visit [http://www.dms.uaf.edu/~rybkin/REU/REU.html](http://www.dms.uaf.edu/~rybkin/REU/REU.html) for more information.