FRIDAY, AUGUST 15

All talks on Friday will be in *Eckhart 206*. Lunch will be in the Barn and Tea will be in the tea room.

11:00am: Representation Theory, Symmetry, and Quantum Mechanics (Evan Jenkins). While the equations governing physical systems often seem forbiddingly complicated, the symmetry that underlies the physical world can provide a beautiful insight into their solutions. In this talk, we introduce some basic notions of representation theory and use them to show how the "quantum" behavior of atomic electrons arises from symmetry. No prior knowledge of physics is required.

12:00pm: Lunch.

1:00pm: Understanding the irreducible representations of $sl_2(\mathbb{C})$ (Alex Rosenfeld). Using a branch of mathematics called representation theory, we can understand certain abstract mathematical structures in terms of something that is relatively well known, linear algebra. Well, it turns out that representations of certain mathematical structures in this way can be broken down into a finite number of fundamental pieces called irreducible representations. My talk is going to discuss what the irreducible representations will look like for $sl_2(\mathbb{C})$, the set of two by two matrices with no trace.

1:45pm: Dirichlet's theorem on the infinitude of primes congruent to $h \pmod k$ (John Binder). During this talk, we prove Dirichlet's theorem that there are infinitely many primes congruent to $h \pmod k$ so long as h and k are relatively prime. Though this is a number theory result, the proof will employ basic results from group theory and complex analysis.

2:30pm: Group Representations (Jon Alperin). A romp from beginnings on Dirichlet characters to problems of current interest.

3:30pm: Tea.

4:00pm: The computational complexity of Stallings Folding Algorithm (Carmel Levy). I will be presenting on Stallings folding algorithm for determining subgroups of a free group, given a set of generators, and the computational complexity thereof. This is a relatively recent solution (published on May 15 of this year!), so it should be exciting to see some new Math—who knows, I may even improve the result.

4:45pm: Pseudotopological spaces, or, How I learned to stop worrying and love ultrafilters (Mike Shulman). Maybe you think a function f is continuous if $\forall \varepsilon > 0 . \exists \delta > 0 . |x - y| < \delta \Rightarrow |f(x) - f(y)| < \varepsilon$. Maybe you think f is continuous if $f^{-1}(U)$ is open whenever U is open. But I prefer to say that f is continuous if whenever y is infinitely close to x, $f(y)$ is infinitely close to $f(x)$. One way to make this precise is with *pseudotopological spaces*, a different approach to topology which turns out to be strictly more general than ordinary topological spaces. In this talk I'll define pseudotopological spaces and try to convince you that they are better-behaved and more intuitive than ordinary topological ones. No prior background in topology is required (but it will help).

6:00pm: Dinner/Party.