



Collider Physics at Texas A&M

Teruki Kamon and David Toback

Texas Tech Visit

August 11th 2005

Overview of the TAMU Collider Program

Big picture:

- **Heavy investment in CDF, want to reap benefits while starting transition to CMS**
- **Photon and Tau Objects/SUSY and model-independent searches/Follow up on $e\gamma\gamma$ +Met & other hints**
- **Strong/Unique ties to our phenomenology group**
- **Plan is to make both long term and short term contributions to CMS**

Today's Goals

- **Help you get to know our team members and what they're working on**
 - **Pictures**
 - **Big picture topics**
- **Find where we have overlapping interests and find ways to coordinate effort**
 - **Make best use of our geographic advantages and our common experiences**

The Collider Physics Team: Professors



Teruki Kamon



David Toback
Promoted to
Associate Professor
with Tenure starting
Fall 2005



Peter McIntyre
Named the
Mitchell/Heep Chair of
Experimental High
Energy Physics

Post-Docs



**Dr. Max
Goncharov**



**Dr. Sungwon
Lee**

(at Fermilab, working to replace the irreplaceable for January)

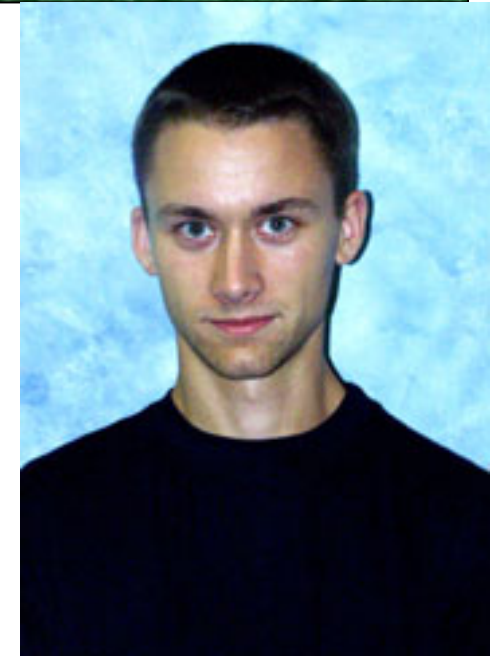
Post-Coursework Graduate Students



**Vadim
Khotilovich**



**Slava
Krutelyov**



**Peter
Wagner**

**Krutelyov should graduate December 2005,
Krutelyov in 2006, Wagner in 2007**

Students taking Courses



Jonathan

Asaadi



Adam

Aurisano



Paul

Simeon*

- **Aurisano has passed qualifying courses**
- **Simeon is an undergraduate Honors student**

Kamon: SUSY with large $\tan\beta$

- **SUSY in $B_s \rightarrow \mu\mu$ (Krutelyov's Advisor)**
- **Analyses with $\tau\tau$ (Khotilovich's Advisor)**
 - **RPV-SUSY Stop and Z $\rightarrow \tau\tau$, LQ3**
 - **Run I RPV result**
 - **LHC prospects for SUSY Co-Annihilation**
- **Lepton+Track Trigger Co-proposer**
 - **Enhances low P_T dilepton searches**
- **CDF Run II TDC upgrade Project**
- **Texas High Energy GRID project**
- **SUSY convener for CDF**



Toback: Photon + Model Independent Searches

- **Leader for EMTiming (Goncharov)**
- **Search for New Physics with photons**
 - **GMSB $\gamma\gamma$ +Met (Lee)**
 - **CDF and Dzero combined result**
 - **Model-independent $\gamma\gamma$ +X in progress (Lee)**
 - **SUSY Long-lived particles \rightarrow photons (Wagner)**
 - **Photon + Met (Goncharov)**
- **ZooFinder**
- **CMS/TAMU Group leader**
 - **Sabbatical approved to secure projects/Admission**
 - **HCal Simulation (Aurisano)**
 - **SLHC HCal trigger upgrade**
 - **Co-annihilation supervising Simeon & Aurisano**



Tenured starting
Fall 2005

Sungwon Lee (Post-Doc)

- **Photon physics expert**
- **Co-leader $\gamma\gamma+X$ search**
 - **GMSB SUSY $\gamma\gamma+Met$ published**
- **Co-creator ObjectMon Online Monitoring**
- **CDF Operations manager**
- **TDC upgrade**
- **Lead postdoc on LQ3 search**
- **Supervision of summer students**

Leaving to take an excellent Faculty position on CMS



**Leaving Jan 2006 for
tenure track position at
Texas Tech**

Max Goncharov (Post-doc)

- **EMTiming Project**
 - R&D, System design
 - Hardware Production coordination
 - Installation leader
 - On-site operations leader
 - Primary software developer
- **Will use EMTiming system to search for new physics in the photon final state**
 - Major improvements to track and vertex timing
 - Photon+Met search
 - Help supervise Wagner on search for Long-lived particles that decay to photons



Slava Krutelyov (Grad)

- **Thesis:** SUSY Search in $B_s \rightarrow \mu\mu$
 - Published in PRL
 - Expected to Graduate December 2005
- **Major contributions to**
 - Muon software
 - ObjectMon monitoring
 - EMTiming R&D, Installation & Debugging
 - Phenomenology paper on SUSY at the Tripler



Recently moved
back to TAMU to
write thesis

Vadim Khotilovich (Grad)

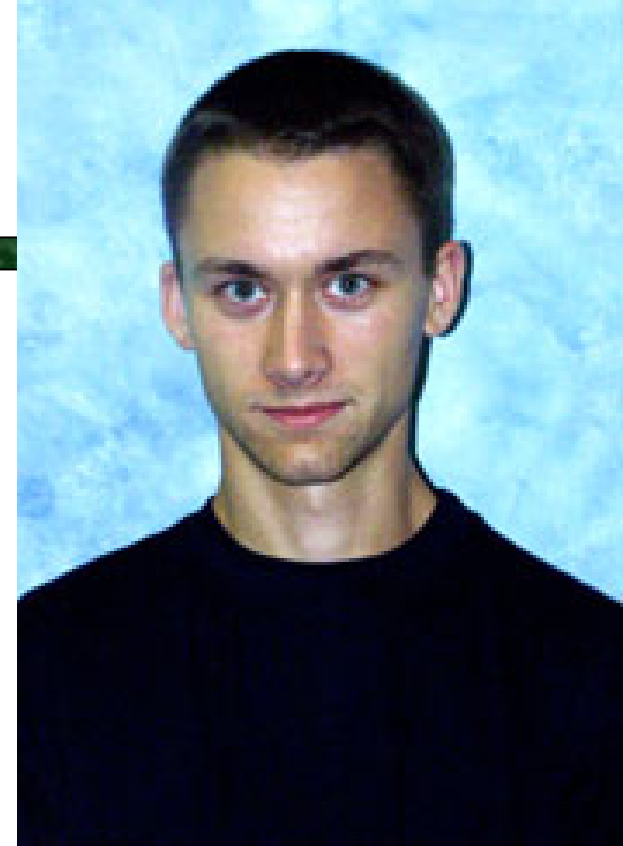
- **Thesis:** Search for RPV-SUSY Stop pair production in the $l\tau_h jj$ final state
- **Big player in Lepton + Track/Tau groups**
 - Validation
 - Trigger efficiencies
 - $Z \rightarrow \tau\tau \rightarrow l\tau_h$ Cross section
 - Tau code librarian
- **Current leader/Guru of ObjectMon**
- **CDF TDC Upgrade Project**
- **Linear collider phenomenology paper on Co-Annihilation region**



At FNAL full time

Peter Wagner (Grad)

- **Thesis:** Searches for long-lived neutral SUSY particles that decay to photons
 - Phenomenology paper published
- **Lead student on EMTiming**
 - Simulation & resolution studies
 - Installation and maintenance
 - Calibration and monitoring code
- **ZooFinder**



FNAL full time

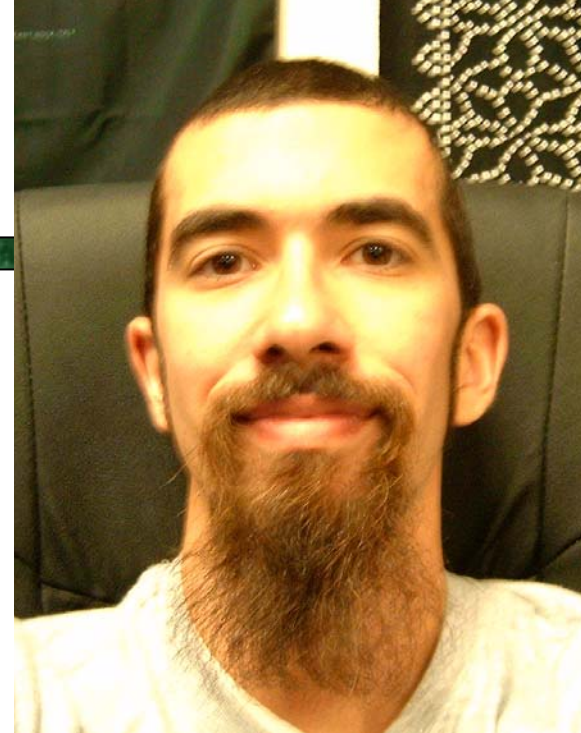
Adam Aurisano (Grad)

- **Recently completed qualifying course work**
- **Working full time this summer on:**
 - **CMS HCal trigger primitive simulation at LPC**
 - **Prospects for measuring the stau-neutralino mass difference at the LHC**
- **Expected to complete remaining course work this year and move to FNAL full time**



Jonathan Asaadi (Grad)

- **2nd year graduate student**
- **Expected to complete coursework over the next year**
- **Lead graduate student for high speed computing for TAMU**
 - **Tensor Beowulf Cluster**
 - **THEGrid**
 - **HiPCAT**



Implementing a monitoring system (GANGLIA) and the use of proper compilers to go between a 64 bit system (Tensor Cluster) and a 32 bit system (e.g. CAF)

Paul Simeon (Undergrad)

- **Second year undergraduate honors program student**
- **Lead student on the stau-neutralino mass difference measurement prospects for LHC**
- **Methods for optimizing the combination of SUSY signals to set limits**
 - **TxAPS travel award**
 - **JURP article accepted**
- **NIM article for EMTiming**



Long Term CDF Service

Hardware:

- **EMTiming maintenance**
- **TDC Upgrade Installation and maintain**

Software:

- **EMTiming calibrations**
- **Lepton+Track Trigger**
- **ObjectMon Monitoring (online and offline)**
- **ZooFinder (“Event of the Week”)**
- **Muon, Photon, tau and Met Identification**

CMS Ramp-up

Hardware:

- **SLHC HCal upgrade project (started)**

Software:

- **HCal Trigger Primitive simulation (well underway)**
- **Grid Computing (well underway)**
- **Just starting:**
 - **Tau ID**
 - **Tau triggering**
 - **Online monitoring**

Summary

- **TAMU group intends to stay strong on CDF and reap the rewards of our large investment, while moving to take an important role on CMS in SUSY/Tau and Photon physics**
- **Coming year**
 - **Plan to hire new faculty hire for CDF/CMS**
 - **Prof. Bhaskar Dutta (Phenomenology) joining us**
 - **Hire new post-doc(s)**
 - **Build bridges with our colleagues around the state**
- **Looking forward to many years of a powerful, coordinated Texas effort on CMS**