Statement of Research Interests

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Past Achievements

I started working in High Energy Physics ten years ago as a student of Moscow Physical Technical Institute in the fixed target experiment GAMS/NA12. I participated in the following physics analyses and detector R&D projects in 1987–1991:

- Assembling and installation of the lead/scintillator sampling electromagnetic calorimeter for detection of the low energy photons emitted at wide angles.
- The first observation of the $\pi^- p \to \eta' \pi^0$ reaction at 38 and 100 GeV/c (Masters Thesis, 1989).
- Observation and mass-independent partial wave analysis of the $\omega\pi^0$ system produced in the $\pi^- p$ charge-exchange reaction at 38 GeV/c. The latter analysis revealed two new meson resonances, $\rho(2200)$ and $\rho_5(2350)$.

I joined the DØ experiment from the very start of its first successful run (February, 1992) as a graduate student at SUNY at Stony Brook. I actively participated in various DØ physics analyses and detector R&D since then:

- My main physics interest in DØ concerned the electroweak sector and searches for the new phenomena beyond the Standard Model. In particular, I worked on various vector boson anomalous coupling analyses, such as $W\gamma$, $Z\gamma$ and WW/WZ production studies in various decay channels of the W/Z. These studies included an experimentally challenging $Z(\nu\nu)\gamma$ analysis which was recently completed and yielded the best limits on the anomalous $ZZ\gamma/Z\gamma\gamma$ couplings available today (this is the first measurement in this decay channel of the Z at hadron colliders), as well as an attempt to observe hadronic W/Z decays in an associated production with the photon, which drastically decreases the QCD background compared with inclusive dijets (this analysis is in progress now). As a DØ Exotics group convener I led searches for the leptoquark pair production in $p\bar{p}$ collisions which recently resulted in the most restrictive limits on the existence of these particles and ruled out an interpretation of the high Q^2 event excess observed at HERA with production of first generation leptoquarks. The most recent analysis I am working on is a search for Dirac monopoles at DØ which is expected to result in the best available limits on the monopole mass to date.
- I also participated in other DØ physics analyses and developed several particle ID algorithms which are currently being used by many physics groups within DØ.
- I participated in the installation, and performed calibration, alignment, DAQ and offline processing of a small scintillating fiber detector which was installed inside DØ for the purposes of precise calibration of the central drift chamber drift velocities and timing offsets.

- I worked on the Monte Carlo studies and physics design of the Forward Preshower detector for the DØ Upgrade, which is now included in the baseline plan for the upgraded detector and being built.
- I worked on R&D, calibration and tests of the SVX II-based Silicon Vertex Detector of the DØ Upgrade. This work includes laser-beam tests of the detector readout system, Monte Carlo studies of the detector performance, development of the tracking and secondary vertexing algorithms, and participation in technical design of detector elements.

I am currently working on the scintillator fiber tracker for th DØ Upgrade, in particular on the VLPC quantum efficiency measurements, other tests and calibration.

Future Plans

The scope of my current research interests is focused on the DØ Upgrade and LHC experiments as a longer term. I consider these experiments to be the best in hadron collider physics in the next decade, and this is the main attraction for me.

- I am excited about the new features of the DØ detector which will be added in course of the upgrade, such as silicon tracker which will allow for efficient b-tagging, central magnetic field and a new central tracker which will make possible *in situ* calibration of the calorimeter, and the superior muon system with nearly hermetic coverage and high efficiency.
- My primary physics interests in Run II embrace searches for new phenomena in general and SUSY in particular. The upgraded DØ detector will be very suitable for this purpose, mainly due to superior missing energy resolution (driven by hermeticity and excellent energy resolution of the DØ calorimeter) and extended lepton coverage. This is the first time when an experiment will actually be able to confirm or rule out a number of SUSY/new phenomena models and this is very interesting to me.
- I would also like to continue my work on trilinear anomalous couplings since with a few inverse femtobarns of integrated luminosity which will be collected in Run II the already tight limits on the anomalous couplings which we have set with Run I statistics will be improved by a factor of three or more which again will alow us to put constraints on the theories which predict phenomena beyond the Standard Model.
- I plan to continue my work on the fiber tracker and tracking algorithms with a possibility to do some other hardware studies, e.g. triggering and DAQ.
- In a longer term I am very interested in joining one of the two major LHC experiments. I am interested in Higgs searches and a variety of other electroweak and new phenomena which can be studied with LHC. The exact scope of my physics interest in LHC will be shaped in course of Run II (and possibly Tev33 run), since a lot of questions crucial for development an optimal LHC strategy will be answered during this coming run (e.g. whether Higgs is found or not, and if not what is it expected mass). I plan to use the experience with the hadron collider environment which I gained and will gain in the next run for developing

better particle ID algorithms and more powerful handles against dominant QCD background at this machine.

- I'd also like to participate in a major hardware project for LHC. It would be particularly interesting for me to work on DAQ and trigger frameworks, luminosity monitoring or electronics for one of the LHC experiments.
- I am looking forward to the opportunity to work with undergraduate and graduate students and hope to be able to share my enthusiasm for physics with them and actively involve them in the research topics I will be working on. I like to work with students, and I consider such a work as a very enriching and educating experience.