# Bell Labs-NIST Workshop on Large-Scale Geometry of Networks

April 26th, 2011
600 Mountain Avenue
Murray Hill
New Jersey

This one-day workshop aims to highlight current work on fundamental geometric methods in modeling and optimization of large-scale networks. In particular, it focuses on recent work on hyperbolicity of network graphs and its possible impact on network performance, reliability, robustness and security with the eventual goal of creating possible analytical summarization metrics for these network characteristics. Some of the specific topics that will be discussed include

- CURVATURE. How to define and quantify this fundamental geometric concept so that it appropriately captures large-scale, rather than local, characteristics
- MEASUREMENTS. How to measure curvature in large-scale networks
- MODELS. Discussion of prototypical hyperbolic network models and their key properties
- FLOWS. Flow characteristics that are specifically influenced by curvature, be they flow of information, rumors, innovation, viruses or other kinds.

The workshop will consist of eight 30-minute invited talks followed by a 60-90 minute discussion among the participants.

Space is available for a few more participants. If you would like to participate, please contact one of the organizers listed below.

Organizers

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**Workshop Agenda**
**Tuesday April 26th, 2011**
**Conference Room 6A-209**
**Murray Hill, New Jersey**

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| M O R N I N G S E S S I O N | | |
| 8:30 a.m. | Arrival/Continental Breakfast | |
| 9:00-9:05 | Lawrence Cowsar | Welcome |
| 9:05-9:15 | Iraj Saniee, Bell Labs & Vladimir Marbuch, NIST | Introduction & Overview |
| 9:15-9:30 | Ronald Boisvert, NIST | Foundations of measurement science of information systems |
| 9:30-10:00 | Onuttom Narayan, UCSC | Curvature of finite graphs and its consequences |
| 10:00-10:30 | Gabriel Tucci, Bell Labs | Traffic characteristics in hyperbolic spaces |
| 10:30-11:00 | COFFEE BREAK | |
| 11:00-11:30 | Roldan Pozo, NIST | Describing network graphs as 3D structures: an alternate metric |
| 11:30-12:00 | Isabel Beichl, NIST & Brian Cloteaux, NIST | Sequential importance sampling for network problems |
| 12:00-12:30 | James Abello, Rutgers | Discrepancy experiments |
| 12:30-1:30 | LUNCH BREAK | |
| A F T E R N O O N S E S S I O N | | |
| 1:30-2:00 | Edmond Jonckheere, USC | Euclidean versus hyperbolic congestion in idealized versus experimental networks |
| 2:00-2:30 | Dmitri Krioukov, CAIDA | Hyperbolic geometry of complex networks |
| 2:30-3:00 | Matthew Andrews, Bell Labs | Analyzing network structure using Racke decompositions |
| 3:00-3:30 | TEA BREAK | |
| 3:30-4:30 | DISCUSSION | |
| 4:30 p.m. | Workshop Program Ends | |
| 6:00 p.m. | Optional DINNER | |