

ISTeC (Information Science and Technology Center) Research Advisory Committee
 Retreat on the Scientific and Engineering Foundations of Information Science and
 Technology
 Saturday, May 8, 8:15am to 3:00pm, Lory Student Center

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Name:	Louis Scharf
Department:	Electrical and Computer Engineering, and Statistics
Email:	scharf@engr.colostate.edu
Office Tel:	970 491 2979
WWW URL:	http://www.engr.colostate.edu/ece
<p>Research Interests (one paragraph): Statistical signal processing for communication, instrumentation, radar, and sonar, with particular emphasis on “expanding subspace methods” for extracting information from space-time fields. We are currently applying our methods to multi-access communication, beamforming, and imaging, but we think these methods may have potential well beyond their current applications.</p>	
<p>Titles of current research projects (funded or not):</p> <ol style="list-style-type: none"> 1. Signal Processing and Channel Modeling in Low-Dimensional Subspaces for Wireless Communication in Multi-Antenna Systems (NSF) 2. Space-Time Beamforming and Diversity Combining in Large Sensor Arrays (ONR) 3. A Mathematical Methodology for Managing and Integrating Sensors and Processors in Distributed Systems for Radar and Communication (ARPA and AFOSR) 4. Space-time and frequency-time communication over randomly time-varying channels using subspace methods (NSF pending) 	
<p>Current collaborations inside and outside your department:</p> <ol style="list-style-type: none"> 1. Edwin Chong, ECE, Optimization and receiver design; integrated sensing and processing 2. Mahmood Azimi, ECE, Canonical coordinates for mine detection 3. Peter Schreier, ECE, Detection, estimation, and coding of nonproper analytic signals 4. Magnus Lundberg, ECE, Multirank Rayleigh beamformers for radar and sonar 5. Ron Butler, Statistics, Adaptive subspace detectors and related topics 6. Peter Brockwell, Statistics, Fractional Brownian motion and related topics 7. Hongya Ge, NJIT, Multiuser detection for CDMA wireless 8. Alfred Hanssen, Tromso, Multidimensional and multivariable time-frequency distributions 9. Olivier Besson, ENSICA, France, Matched direction filters for space-time processing 10. Ben Friedlander, UC Santa Cruz, Signal processing and channel modelling in low-dimensional subspaces 	

Breakout sessions you would like to attend at the retreat (please rank order from 1 to 3):	
	Alternative models of computing
3	Computing and information processing in support of basic science and engineering
2	Dense sensor networks
1	Imaging and tracking
	Automatic image, text, and speech recognition for multimodal interfaces and search engines
	Other (Please suggest a title.)

Faculty at CSU whom you would like to see included into your preferred breakout group:

My interests are probably closest to those of the mathematicians and statisticians who participate, but I would look forward to joining anyone interested in the theory and application of compressed models for large data sets of or high time-bandwidth product.

One optional paragraph you would like other participants to read before the retreat:

Electrical and computer engineers typically deal with large data sets of high time-bandwidth product. These require compression and/or processing at high rates, in real time. To date our methods are based on the algebra and geometry of linear models. I am interested in finding out whether our current methods can be applied outside of communication, radar, and sonar, and whether our current methods can be generalized, using ideas from abstract algebra and modern geometry.