

## Attachment 1 – Research Topic Template

PA Approval #88ABW-2016-3605

1. **Research Title:** Fokker-Planck Techniques for non-Gaussian RF Signal Sensing
2. **Individual Sponsor:**

Dr. Robert Ewing, AFRL/RYZC  
 WPAFB, OH 45433-7333  
[robert.ewing.2@us.af.mil](mailto:robert.ewing.2@us.af.mil)

3. **Academic Area/Field and Education Level**  
 Operational Research or Electrical Engineering and Computer Science/Systems Analysis, Operations Analysis, Mathematics Communications, Control and Signal Processing (MS or PhD level)
4. **Objectives:** Developing the methodology of algorithms for characterizing subthreshold signals in contested spectrum of non-Gaussian environments.
5. **Description:** Simulation toolboxes for this technique to the domain of distributed RF sensing integration is required. The solutions of the PDEs can be optimized and solved by special techniques. Through the use of non-Gaussian RF signal sensing, optimal decision rules and improved RF detection will occur by the following:
  - (a) Optimizing RF spectrum detection and decision methods incorporating the Fokker-Planck equation to model time-varying probability density functions.
  - (b) Developing parametric or non-parametric (data independent models) RF detection methods via maximum likelihood or other new statistical methods using probability density estimation algorithms.
  - (c) Examine the detection problem in a distributed sensing system.
6. **Research Classification/Restrictions:** U.S. Citizens
7. **Eligible Research Institutions:** Indicate to what organizations this topic should be provided

**DAGSI** (Wright State University, AFIT, Ohio State University, University of Dayton, Miami University, Ohio University, University of Cincinnati)

**AFIT** (only)

**USFAA** (only)