

## Bahl - Available Projects

There are a range of project opportunities for postdoctoral fellows in the applied molecular epidemiology research group. The overarching goal of this research program is to use pathogen genomic information to learn about unobserved drivers of infectious disease dynamics across biological scales. Current projects include understanding the role of race/ethnicity in epidemic patterns of transmission of HIV, SARS-CoV-2, Influenza and Respiratory Syncytial Virus; characterizing the immune landscape to predict influenza variant fitness; ecological and epidemiological modeling of pathogens with pandemic potential (ie HPAI); developing methods for the rapid identification of transmission clusters; developing mathematical and phylodynamic models to understand impacts of co-circulating pathogens on epidemic dynamics.

In addition, trainees will have the opportunity to contribute to establishing a national agenda for enhanced molecular surveillance of emerging pathogens and pandemic preparedness through the Pathogen Genomics Centers of Excellence. As well as training and funding opportunities through the Centers of Excellence for Influenza Research and Response.

2022-2027 Co-Principal Investigator “CAPE Center for Applied Pathogen Epidemiology and Outbreak Control” Funder CDC. RFA CDC-RFA-CK22-2204. **Awarded – Total is 18M. Base includes >\$1.3M annual to UGA. The contract is pending. Funds 2 post docs, program coordinator, admin support, computational support, 5 PhD students.**

This program aims to link academic units with state public health departments to advance the use of molecular approaches to inform public health responses to infectious disease outbreaks. The goal of the funding opportunity is to more closely link molecular epidemiology studies being conducted in academic institutions with public health practice and prepare the workforce to with skills to use multiple data streams and modeling approaches to respond to infectious disease threats more effectively.

2022-2025 Principal Investigator CDC 4050005022224023 (RGDPH000145190A) “Developing state molecular epidemiology workforce capabilities and analytic tools” \$1,060,000. **Funds 1.5 Postdocs, 1 PhD Student**

Through this contract, we are developing analytical pipelines for newly generated viral, bacterial, and foodborne pathogens. In addition, we are training of newly hired molecular epidemiologists and developing workforce training materials.

2022-2024 Co-Investigator “PIPP Phase I: Heterogeneous Model Integration for Infectious Disease Intelligence” PI – John Drake NSF 21-590 Predictive Intelligence for Pandemic Prevention Phase I: Development Grants (2200158) **Funds 1 PhD Student \$1,000,000**

We will adopt and adapt the System-of-Systems (SoS) approach pioneered for complex engineering problems to establish a novel emerging platform focused on real-time pandemic prediction and public behavior guidance. This project will focus on influenza A virus and will combine mathematical epidemiology and statistical phylogenetics to examine the collective role of epidemiological, immunological, and evolutionary processes in shaping viral phylogenies.

2021-2027 Co- Investigator “Center for Influenza Disease and Emergence Research (CIDER)” PI - Mark Tompkins NIH NIAID Centers of Excellence for Influenza Research and Response (75N93021C00018) \$65,813,901

Comparative genomic analysis and statistical phylodynamic modeling of influenza A and B virus and avian influenza A virus to understand the processes of viral transmission and persistence in human and animal populations

2021-2023 Co-Principal Investigator “COVID-19: Community scaled viral sequence analysis and phylodynamics for SARS CoV2 using wastewater-based informatics” PI - Erin Lipp Center for Disease Control (CDC 75D30121C11163) **Funds 0.5 Postdoc, 1 PhD Student \$949,898**

1) Develop and optimize a scalable target enrichment and sequencing strategy for SARS-CoV-2 from wastewater, 2) implement a wastewater-based testing approach for longitudinal and targeted analysis of SARS-CoV-2 variants, and 3) conduct community-scaled comparative sequence analysis and molecular epidemiology using wastewater and clinical surveillance data.

2021-2023 Principal Investigator “Molecular epidemiology and transmission dynamics of COVID-19 in Houston, Texas” Center for Disease Control (CDC 75D30121C10133) **Funds 1 post-doc 2 PhD students \$1,116,539**

Combine epidemiological surveillance with comparative genomic analysis of viral sequence data in a statistical phylodynamic framework to understand the characteristics of SARS-CoV-2 transmission dynamics. The rapid spread of SARS-CoV-2 complicates control efforts. This project aims to address the need for robust and rapid computational methods to understand how population characteristics determine the rate and patterns of community transmission to enhance control efforts.

2021-2023 Principal Investigator “A genomics-based system to predict the seasonal influenza virus evolution and epidemic dominance” Center for Disease Control (CDC 75D30121C11990) **Funding for 1 post-doc, 2 PhD Students \$732,271**. Renewal of this award is pending, 2023-2025

The main goal is to predict which influenza virus lineage will dominate in future epidemic seasons and early identification of vaccine escape variants, key predictions to effectively control, limit and eventually, eliminate influenza disease burden from human populations.

2019-2026 Co-Investigator “The Center for Influenza Vaccine Research for High-Risk Populations (CIVR-HRP)” Research Area 003. PI - Ted Ross. (NIAID-NIH: HHS-NIH-NIAID-BAA2018) **\$130,177,556 Funding available for 1 PhD student**

Coordinates statistical modeling research group for the contract. Serves on the scientific leadership committee. Oversees phylogenetic modeling of seasonal influenza viruses, with a focus on mapping epitope drift and replacement, computational design of ancestral sequence for vaccine testing.