附：报告摘要与专家介绍

Dynamic Modeling of COVID-19

Zhen Jin (Complex Systems Research Center, Shanxi University, China)

The outbreak of the Corona Virus Disease 2019 (COVID-19) epidemic began since last December that has spread the fastest, caused the most extensive infections and has a huge impact on the safety of human life. Dynamical modelling is one of the useful methods to reveal the transmission rule of COVID-19 spread which is based on the internal transmission mechanism and can dynamically predict the future trend according to the current information. In the talk, we will introduce some of the transmission dynamics models of COVID-19 under intervention: homogeneous mixed dynamics model, network dynamics model, and household dynamics model；We also evaluated isolation and other interventions measures.

靳 祯，山西大学二级教授。现任山西省"疾病防控的数学技术与大数据分析"重点实验室主任，山西省数学会理事长，中国生物数学学会副理事长，中国数学会理事，多个国际期刊编委，山西省科技创新团队带头人。曾获教育部新世纪优秀人才，山西省教学名师，全国优秀教师等荣誉，享受国务院政府特殊津贴。主要从事生物数学及复杂网络研究工作，先后主持国家自然基金项目6 项，其中国家基金重点项目1 项，国家重点研发计划子项目1项。作为第一完成人， 2010 年获得山西省科学技术奖（自然科学类）一等奖，2014 年获得教育部高等学校优秀成果二等奖（自然科学类）。发表 SCI 收录论文200余篇，有12篇论文人选 ESI 高被引，出版学术专著7部（合著），连续入选爱思唯尔数学高被引学者。

COVID-19 in the Canadian Context - Disease spread and healthcare demand

Jane Heffernan (York University, Canada)

COVID-19 spread in Canada's provinces and territories has great differences (i.e., large differences in populations, different testing rates and reporting rates), which makes it difficult to project disease progression in each population. It is therefore very difficult to determine healthcare demand and project the level of personal protective equipment (PPE) (including goggles, visors gloves, surgical masks, N95 masks, etc) is needed at what time for each region. In this talk I will give a brief overview of COVID-19 in Canada. I will then discuss a disease modeling and healthcare demand framework, adapted from a framework used by collaborators in Australia, to project healthcare demand and PPE need. The work is based on different social distancing, self-isolation, contact tracing, and school closure scenarios.

Jane Heffernan is a Professor of Mathematics & Statistics at York University, where she leads the Modelling Infection and Immunity Lab in the Centre for Disease Modelling. Awards include the Governor General's Gold Medal, CAIMS-PIMS Early Career Award, an NSERC Acclerator Supplement, and a York Research Chair (Tier II). The primary goal of Dr Heffernan's research program is to uncover key contributors to infectious disease pathogenesis in-host (immunology and virology) and in populations (epidemiology). Studies include the effects of vaccines/therapeutics, social distancing, social immunity (bees), pathogen evolution, and the immune system. Dr Heffernan's work is funded by the Natural Science and Engineering Research Council of Canada (NSERC), the Canadian Institutes for Health Research (CIHR), and government and healthcare sector contracts. Her work is published in high profile journals in Mathematical Biology and Health, including, the Journal of Theoretical Biology, Bulletin of Mathematical Biology, Vaccine, Lancet Infectious Diseases, and the Journal of Infectious Diseases.

Assessing the risks of spatial spread of COVID-19

Julien Arino (University of Manitoba, Canada)

I will present a model for the spatial and temporal spread of COVID-19 and will explain how this model was used during the early stages of the pandemic to assess the risk of importation of the disease to heretofore uninfected locations.

Julien Arino is a Professor with the Department of Mathematics and the Data Science NEXUS at the University of Manitoba and a faculty member of the Visual and Automatic Disease Analytics Graduate Training Program. He is a member of the Centre for Disease Modelling and of the Canadian COVID-19 Mathematical Modelling Task Force. His research deals primarily with mathematical population dynamics in epidemiology and ecology, with focus on modelling population movement. Of particular interest to him is the spatio-temporal spread of infectious diseases. A lot of his work concerns the relationship between modern commercial aviation and the fast global spread of infectious pathogens. Another problem of interest to him concerns the stress imposed on public health systems by the variety of health practices used around the world or even, within a country.

COVID-19 疫情二次爆发风险的模型和数据分析

Models and data analysis of secondary outbreak risk of COVID-19

Sanyi Tang (Shaanxi Normal University, China)

在庚子年春节前后爆发的 COVID-19疫情给社会正常生活、人民生命健康造成了重大影响。随着2020年1月23日武汉采取的封城和各地不断加强的防控措施，全国各省市自治区的疫情得到有效遏制，逐渐取得了防控的阶段性成果，疫情态势在短时间内也不断向好的方向发展。但是随着 COVID-19无症状感染者传播风险以及境外输入病例的增加，给"外放输入，内防反弹"的防控策略带来巨大压力。因此，我们希望通过构建相应的 COVID-19疫情传播网络、离散等动力学模型，结合数据，分析人口流动，复工复产，无症状感染者的潜在传播风险和病例输入等关键因子对 COVID-19疫情演化和二次暴发的影响。

唐三一，博士学位，博士生导师。2003年中国科学院数学所获得博士学位，2003年至2007年在英国 Warwick 大学进行博士后研究，此后先后到加拿大、美国、日本、德国、法国等国知名大学从事合作研究或作大会特邀报告，建立了广泛的国际合作关系。研究方向为生物数学和生物统计学，发表论文120多篇，被 SCI 杂志引用超过3000次。完成或主持数理、信息、医学等不同学部国家自然科学基金5项（4项面上和1项中美生物医学国际合作），参与1项国家自然科学基金重点项目（第二参与人），研究成果获陕西省自然科学二等奖1项（第一完成人）。多次应邀出席生物数学国际大会并作大会特邀报告，2018年获陕西省科技创新领军人才称号。

目前主要从事生物医学与传染病防控中问题驱动的核心理论与大数据分析研究。发展和创建了一套分析脉冲半动力系统的定性理论方法，推广了非光滑 Filippov 系统理论在生物医学阈值策略中的广泛应用，解决了非线性、非光滑米氏药动学方程解析求解的理论难题。在混合生物系统以及随机脉冲微分方程模型辨识、随机切换点估计等方面发展了新思想与算法。 研究成果在害虫综合治理策略设计、突发性传染病预测预警、药动学参数确定、肿瘤综合治疗与药物毒理效应等方面产生了非常重要的影响。有关甲型 H1N1、COVID-19等重大突发性传染病防控的研究成果成为国际上评估我国疫情严重程度的重要参考，得到中外媒体的高度关注和广泛报道。