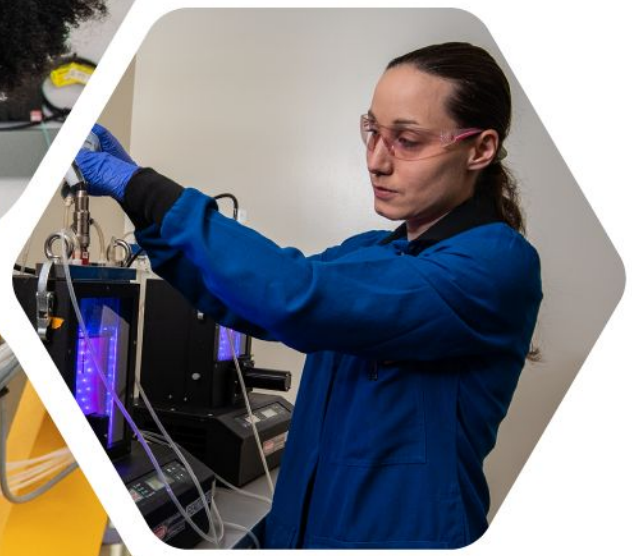


BioSciences

MBIB COVID-19 Related Research

Paul Adams, PhD
MBIB Division Director

May 7, 2020

BERKELEY LAB

U.S. DEPARTMENT OF ENERGY

Engagement in DOE NVBL Working Groups

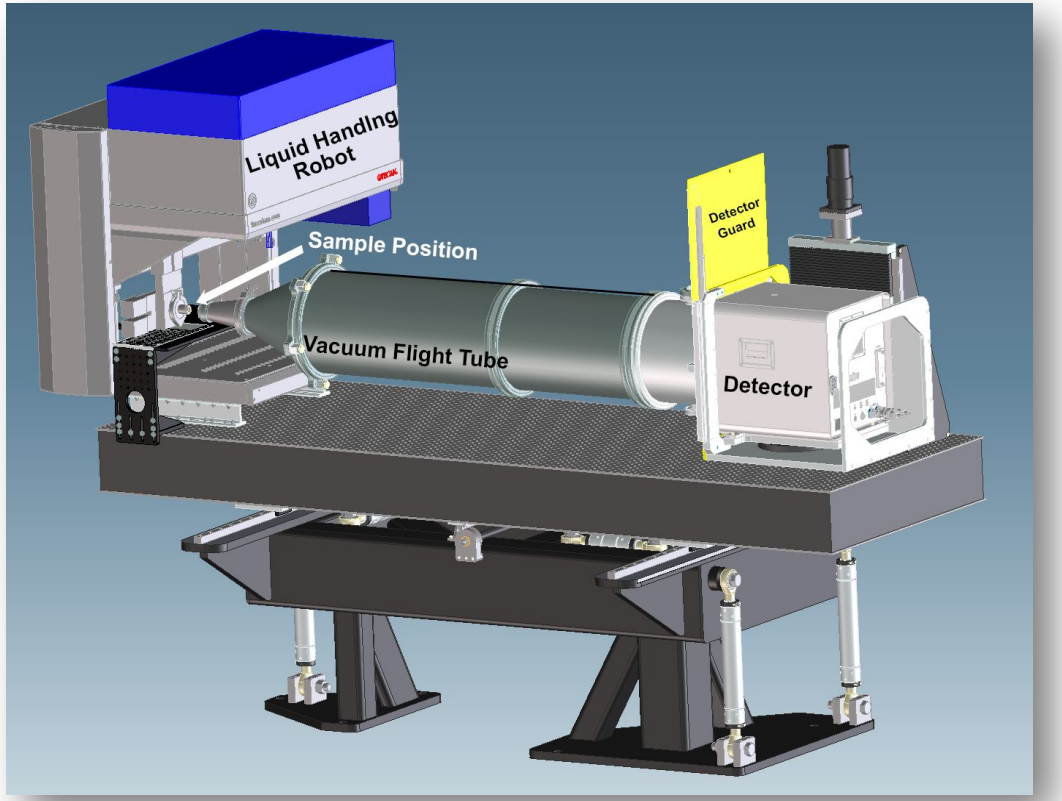
BioSciences

- **Testing**
  - Structural biology to aid in the design of new diagnostics
- **Molecular Design of Therapeutics**
  - Computation for prioritizing viral and host targets
  - Computational design of new anti-viral small molecules
  - Structural biology assisted drug design
  - Biochemical validation
- **Biodesign of Host-Directed and Combination Therapeutics (proposed)**
  - Production of reagents
  - Impact of viral proteins on host cells
  - Structural biology of viral/host protein interactions

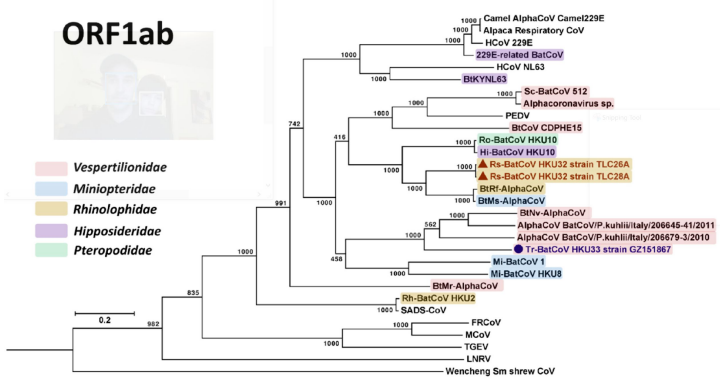
Small Angle X-ray Scattering (SAXS) at the ALS

BioSciences

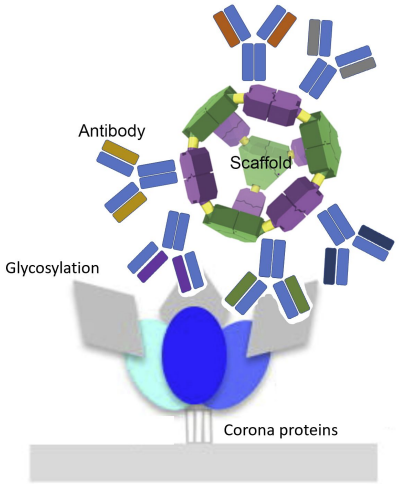
- Liquid handling robotics + Synchrotron High Flux beams = High-throughput structural analysis of viral proteins and target complexes in solution



- Rapid characterization of viral proteins and their many interactions under various contexts



- Ideal for testing designed engineered structures for viral detection and vaccination

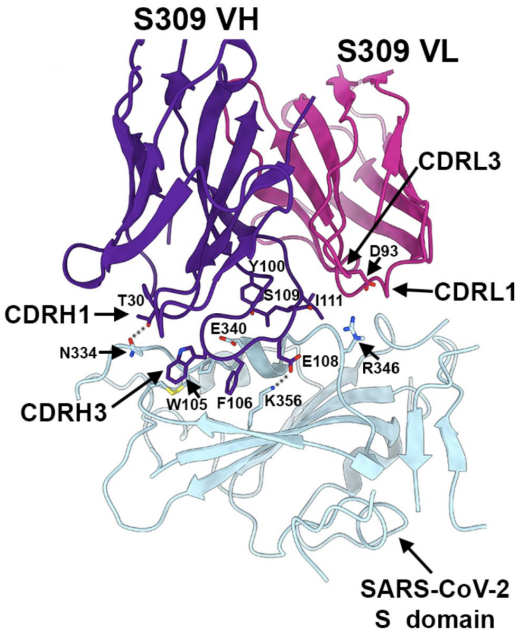


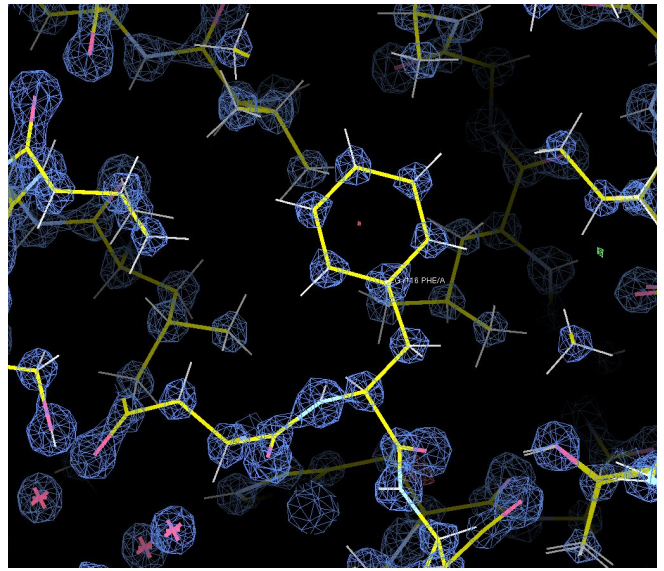
Greg Hura, Beamline 12.3.1

MBIB ALS Beamline Activities

- The ALS is operating in a limited capacity supporting COVID-19- related research and proprietary research (all remote operation)
- MX/SAXS beamlines from the ALS-ENABLE program are accepting research proposals: http://als-enable.lbl.gov/
- Soft X-ray Tomography beamline also available for COVID-19 research

- MX data collection on crystals from academia and industry
  - Vir Biotechnology, Novartis, IniXium
  - University of Washington, UCSF
- Structures have been solved by the Veesler Group (U. Washington) and combined with cryo-EM data to understand how an antibody binds to and neutralizes SARS-CoV-2





Jaime Fraser (UCSF), Beamline 8.3.1

D. Pinto et al., *bioRxiv* preprint (April 2020), accepted in Nature. Work was performed at Lawrence Berkeley National Laboratory, ALS/BCSB Beamline 5.0.2.

Safety

- No work with live virus
  - MX/SAXS work is on isolated viral proteins or viral proteins in complex with antibodies, antigens or host proteins
  - SXT work is on fixed cryo-cooled host cells and virus
- Lab work with viral protein gene constructs requires approval by the Lab's institutional biosafety committee (IBC)
- ALS beamline use is either performed remotely or by trained beamline staff
- Social distancing requirements are integrated into revised WPC activities at each work location