Summary from breakout session in GWs

Physics drivers

- Data cleaning
  - Subtraction of 60Hz power mains demonstrated; can be extended to other calibration lines.
  - Established improvement in range without affect parameter estimation
  - Inference latency is not the bottleneck. Compute is OK for now - may become an issue in future if method is applied to multiple witness channels.
  - A cleaned/un-cleaned dataset should be made available in public domain for the community.
- Searches
  - SPIIR: ML being used to build better detection statistic using SNR timeseries in SPIIR. Other data products like skymaps also being produced. Compute: ~100 nodes with 1 GPU each. Latency - 8-10s. Still a WIP
  - BBHNet: different paradigm: Resnet acting on strain -> response as a function of time. Preliminary results look promising, validation checks being done. Still a WIP. Need to think about connecting to alert data products.

Physics drivers

- Unmodeled searches
  - MLy: Burst pipeline currently completing review for O4a. Latency ~8s.
  - O4b could see improvements like increase in bandwidth, retraining schemes, which will likely need more infrastructure. Currently, A100 GPUs used for training. Inference can be done on CPUs.
  - CCSNe searches: could be done via anomaly detection.WIP.
- Parameter estimation
  - DINGO shown to work for BBH signals. Robustness checks done. Under review. Plans for O4 offline running. Not targeting retraining schemes right now. Latency: inference is in minutes with single GPU.
  - Low-latency sine-gaussian PE in A3D3 is WIP.

Providing cleaned data will be useful for both searches and PE for testing purposes.

Benchmarking analysis

Need for an MNIST-analog for new searches and PE

- LIGO Burst benchmark are ongoing efforts within the LVK.
- Ideas for CBC: Delta function distribution in masses for VT calculation and comparison.
- Dataset should be GWF frames.

Difficulties

- This standardization is difficult in data cleaning case. Observatory specific.
- Alternative: derived quantities like range, pipeline VTs when running over clean data is an option.

Results on existing data is needed as a benchmark

Computing needs

- CVMFS for data sharing, IGWN conda envs, containers exists; but should be more widely advertised, used, and improved upon.
- Researchers need allocation to perform analysis on clusters other than LDG.
- Job scheduling tools for ML workflows need a change. Co-processor management i.e. triton and similar; containerization, orchestration using kubernetes or similar should be made available.
    - Differences in these tools between HPC centers: Podman, shifter in NERSC vs. kubernetes/kubectl in SDSC.
    - LDG currently does not support kubernetes.
    - Need HPC centers to provision tools that easily translate between centers.

Setting standards and community participation

- On the researcher side will likely be driven by need.
- We are in *early stage*
  - Be wary of over-generalizing tools/code - may not be as effective.
  - However, having a forum i.e. mattermost channel to discuss difficulties, and willingness to contribute to further generalize should be encouraged.
  - New feature additions should be advertised over these forums.
- Re-using existing tools. Audit after some period.