

## CHPB-20-2018: A General Open-Source Platform for Evaluating Advanced Vapor Compression Air Conditioners and Heat Pumps (Y2)

### Objective:

- Extend the novel cycle configurations available
- Integrate variable speed equipment with experimental validations
- Add calibration and optimization routines and simulate seasonal performance

### Problem

Enhance the flexibility of the code to allow the selection of components within a user-defined cycle

### Expected Results / Impact:

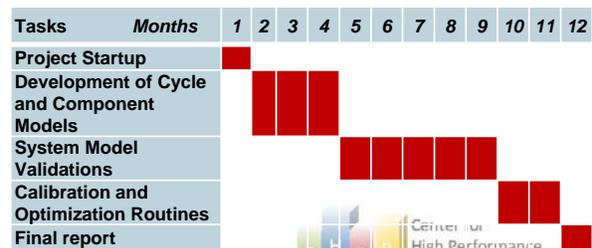
- Extensive validation of all the vapor-compression cycles implemented
- Possibility of calibrating a detailed cycle model with experimental results provided by the user
- Accurately predict the performance during off-design
- Optimize units by utilizing variable-speed equipment
- Evaluate the impact of new working fluids

### Approach:

- Modify vapor-injected cycle to handle two-phase conditions at the economized compressor inlet and multiple injection lines
- Add oil-flooded compression cycle for cold climate HPs
- Improve charge-inventory solution scheme with calibration procedures
- Add variable-speed models for the compressor and the fans

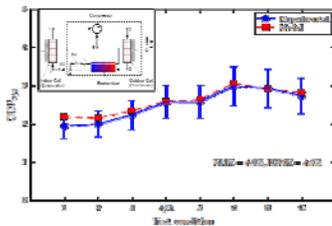


### Schedule



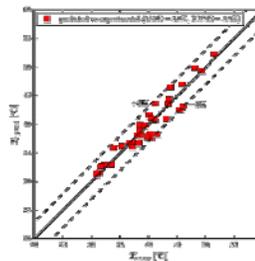
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### Cycle modeling

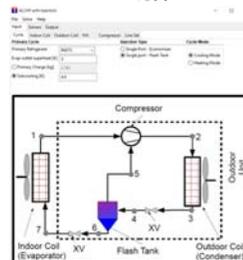
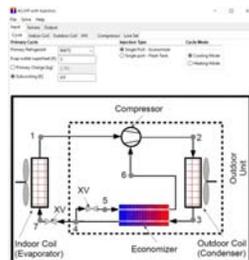
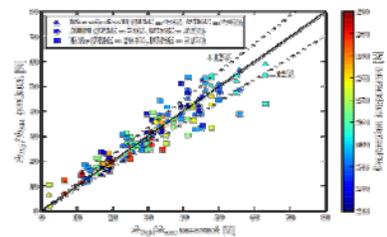


### Equipment modeling

#### CO2 Gas-Cooler



#### Vapor-injected variable-speed compressor mapping



### GUI development:

Vapor-Injected compression system with economizer(left) and with flash tank (right)

