ALS-COLTRIMS Plan:

Beamline 10

Follow these steps:

1. Take care of the beamtime preparation checklist first: http://amo-csd.lbl.gov/downloads/Checklist%20for%20Beamtime.pdf

2. Finish building the spectrometer (meshes, feet, resistors, cables, etc.)

3. Get the telescope and the right stand (reserve the stand with a note!!!)

4. Put MCPs on detectors and detectors on spectrometer. Figure out the length of the cables going from the detector to the chamber feedthroughs (MCP rings may need to be rotated since cables are as short as possible).

5. Disconnect some of the foreline hoses.

6. Put forepumps on pallet jacks (no need to lift them by hand).

7. Disconnect the beamdump. Cover the ends with CF plastic protectors and aluminum foil. Put the beamdump support stand on a cart.

8. Fill up the red KF equipment box (copper rings, O-rings…).

9. Put boxes (lemo, SHV, BNC cables, KF equipment) on a cart. There is no need to bring the following boxes: Lab jacks, powercords.

10. Put beamdump + regulators in LBL cardboard boxes and on a cart.

11. Put water and vacuum hoses in LBL cardboard boxes and on cart.

12. Put exhaust hoses in LBL cardboard boxes and on cart.

13. Take out the earthquake brackets at the controller cart and the chamber

14. Take out the crane and the Aluminum support block of the crane stand and bring the crane stand up while loosening the bolts at the crane post.

15. Lower the controller cart and the chamber and move the feet all the way up

16. On BL 10 get the big table on wheels and the first grey cabinet out of the way. Tie up the water hoses and the exhaust. Ask beamline scientist for help. Ask him to de-install the big magnet on the ion getter pump on the neighboring beamline.

17. The footprint of the COLTRIMS setup at BL 10 should look like this: http://amo-csd.lbl.gov/downloads/BL10_LAYOUT.pdf

18. Move the chamber to the beamline very slowly and carefully (consider using a pallet jack).

19. Setup and align the telescope to the photon beam (choose enough space between the beamline and the position of the scope so that the chamber fits in between and leaves a walkway). Ask beamline scientist about the direction of the photon beam (angle, position). At beamline 10 install a plumb over the small differential pipe of the beamline pointing towards the center. Tilt the telescope and focus on the thread of the plumb; it needs to be in the cross hair of the scope otherwise you are not in line with the photon beam.

20. Move in the chamber. At BL 10 no blue car jacks are needed and in principle no transfer plates should be needed either. Find the right height: You only have to crank up the chamber by about 0.5in. Leave enough clearance for motion to the left and right and up and down. If you need you can now put in the 4 transfer plates under each foot one by one and move the chamber to the left and right as well as up and down (turing the feet). Fine tune the position according to the telescope. The reference points are the entrance and exit of the little tube inside the differential stage. Once you are happy with the alignment put the 4 red scissor jacks under the chamber frame and lift the chamber just very slightly so that you can take out the transfer plates one by one and lower the feet to the ground. Check again with the telescope. In best case the pre-aligned chamber and differential stage then fit right in. However, you can readjust the height while using the 4 feet of the chamber and the left/right platform screws. **Note:** Don't forget to loosen all locking screws on the chamber and differential platform **AND** open the left/right adjustment screws on the differential stage as well ! Do not try to move the chamber frame with a hammer banging at the feet – you may use an 8020 or unistrut bar as a lever. Install the beamdump in a straight way and adjust the support post. The alignment should result in a straight line, i.e. if the bellow between the differential stage and the beamline shows an s-curve something is wrong. In worst case this can be corrected even under vacuum while using the transfer plates, however there is not a lot of space to install them with all the pumps and equipment around.

21. Clamp down the chamber with the earthquake brackets. If you don't find threaded holes in the ground inform the beamline manager and Monroe Thomas to drill these holes for you.

22. Ground the chamber. Make use of the ground-extender.

23. Bring in the jet forepump. Find the Aluminum 3-step ladder from the ALS (there is one leaning against the hutch at the aisle between BL 10 or 11 or go around the ring and in building 7 to find and borrow it). Put it over the forepump. Make the KF connections: Use the right KF hose (do not change any KF crosses at the turbo) – it should go under the frame (that's important to install the Helmholtz coil later).

24. Put in the spectrometer with the detectors VERY VERY carefully (it will be heavy).

25. Connect all the wires to the flanges according to the Roentdek webpage or the logbook. **Note:** Make sure the wires with High Voltage are not going parallel with any other wires or any signal wires comes too close to the chamber walls. Make sure all signal wires are short.

26. Find the overall alignment. The center of the spectrometer should be 1 to 2mm above the photon beam.

27. Mount all the phosphors and adjust them and check their motion pathways.

28. Install the apertures in the back and in the front (they should go in that far that they just cover the copper plates of the spectrometer leaving something like an 8mm gap).

29. Connect the differential pumping stage to the beamline. Close the valve and start pumping with the orange drytel (the turbo pump and the ion gauge on the differential stage should be off for now)

30. Put down the crane post (the Aluminum block for the post is likely not to be needed) and install the crane.

31. Recheck all connections and take a picture of the inside of the chamber, in particular of the wiring of the detectors and spectrometer.

32. Close the chamber, i.e. put the lid on and connect the foreline hose.

33. Bring in the other forepumps. Connect all the KF hoses and also the exhaust hoses.

34. Bring in the controller rack and put it behind the crane post and next to the beamdump pipe. The front panels should face the beamdump. Connect the cables to the gauges and turbo pumps.

35. Ground the controller rack.

36. Mount the second Helmholtz pair arm.

37. Mount the Helmholtz coils and connect them to the big powersupply. **Note**: The electric power cables should go over the beamdump pipe to support the weight which helps to reduce the strain on the electrical connection. Ground the Helmholtz powersupply cart first.

38. Pump down the setup (close all foreline valves, open all bypasses, close the vent valve, start the forepumps, open the valve on the source foreline slowly while watching the manometer, after a while open the valves on the other forepumps slowly as well, start the turbos, once all turbos are on full speed start the ion gauges – if an ion gauge won't start it's likely that the connector has to go in another position)

39. Bring in the electronics rack. It should go in front of the differential stage.

40. Ground the electronics rack.

41. Hook up all SHV cables and decoupling boxes. Make use of the clamps on the CF2.75 flanges to support the decoupling boxes. Ground the decoupling boxes with the green grounding cables. Connect the lemo cables. Perform a detector test if the vacuum is better than 1E-6mbar. **Note:** The spectrometer needs a decoupling box too. **Note:** The walk level on the CFDs needs to be adjusted that way that the zero is slightly above the baseline

42. Bring in the acquisition computer. It should go left to the electronics rack if possible. **Note:** Store the data on the RAID system (not the local D-drive)

43. Get a LN2 dewar and the right PPE for the coldtraps.

44. Find a good place or a stand to install the gas bottle. Tie it down on the top and on the bottom

45. Install a copper gas line and perform a vacuum leak test.

46. Put a fan next to the gas regulator in case of H2/D2 or similar.

47. Perform a jet test (connect gas bottle, pump out the lines, close all bypasses).

48. Clean up the place for the upcoming safety inspection (avoid trip hazards, make everything earthquake safe, check groundings, check the exhaust system…).

49. wait for the photon beam and do the crude alignment with the transfer plates while looking at the phosphors (first align the telescope and then move the

chamber). Use the chamber plate motion for fine tuning. **Note:** Do not forget to loosen the bolts AND adjustment screws at the chamber plate AND the differential stage.

50. ask the beamline scientist for an absolute photon energy calibration

51. use the RAID system to store all data.

52. try to set the magnetic field to the approximate value with the powersupply. Then use a low electric field and rather low energy photo electrons to see 2 to 3 wiggles.

53. use 38eV photons to ionize He and look for the ion and electron TOF spread to fine tune the electrical field.

54. run several photon energies (for instance: 24.6, 25.6, 26.6, 29.6., 34.6, 38.6, 42.6eV) and ionize He for a electron TOF to excess energy calibration.

55. use 60eV photons to ionize N2 and look for KER peaks