Archive 4/13/15 to 11/23/15

--SBIR –4/13/15 Phase II proposal submitted.  Will take a few weeks to get a decision, funding will start in July/August. 5/4/15 we expect a funding decision by end of May according to Francis Thio.5/18/15 - I hear that a funding decision is immanent.5/25/15 funding decision should be in the next couple of days.6/15/15 OUR APPLICATION (Additive manufacture (3d printing) of plasma diagnostic components and assemblies for fusion experiments) HAS BEEN RECOMMENDED FOR AN AWARD BY DOE.  Contract negotiations with SBIR office will follow in coming weeks. 6/22/15 core team formed, since this is a major effort, a separate technical summary will be maintained. 7/615 contract negotiations seems to be going well.  Kickoff call this week (11-12pm Pacific on Friday 10th) 7/13/15 - Kick-off call was well attended on Friday.  We set out near term objectives for discussion as soon as contract is finalized (likely today or tomorrow).  Let me know if you want to be on the distribution for the separate detailed discussion of this contract. 7/20/15 DOE says contract should be funded this week.  Paul coming next week to visit and get the ball rolling.7/27/15 contract live today, James hired... Paul visiting on Wednesday.8/3/15 Paul hired, will be looking for Physics RA for Seattle, Engineering RA for San Diego to support Paul. Last week we discussed the technical and business priorities - these will follow in a separate missive (if you want to be on that distribution Bick, Tom, Kara, Ron, please say).  Paul is planning on being first author on a post-deadline abstract on the diagnostic development (see draft posted below).  8/10/15 started in on the technical objectives pre-APS. 8/17/15 San Diego Lease signed, new San Diego office opened today!  UW and UMBC awards made.  Tearing in to technical milestones pre-APS. 8/24/15 first parts to be printed in metal should be sent to printers this week so we can get on with materials testing.  Still organizing materials from Phase I, APS in sight. 8/31/15 after visiting UMBC it seemed clear that we didn't need balls, just flat-stock, which will reduce costs. APS content ongoing. 9/8/15 APS content still being developed, likely the focus will be on items for discussion in SD shortly. 9/21/15 content for APS still being generated - parts sent off for manufacture already for UMBC. UW yet to start in on work, although paperwork done now.  SD office opening. 9/28/15 SD office open - Paul S has picked a GREAT location, just 10 minutes from GA/UCSD/Far-Tech and an hour from TAE.  Paul's computer on order.  James and Paul M worked on Langmuir design.  Alex is getting going with engineering design, and we are about to oder Optica which is based on Mathematica. James has ordered parts for UMBC testing (likely sent this week). 10/5/15 Optica installed on Control (email James if you need an account), parts on order, design software installed today, getting the ball rolling for APS (see abstract below). 10/12/15 it became clear last week after an unsuccessful bid on an Langmuir system that we don't have our ducks in a row for conventional EDRs - lots of effort ongoing now to get the information onto the website, generate content for EDRs before APS.  Everyone now has something to focus on - let me know if you have not.  Parts are on order for UMBC outgas testing, and Optica is installed - James has got some results already.  Morgan has just asked for Langmuir and RFA EDR for Wednesday at 2pm.  Call in on 206 905 9477 if you want to sit in.  Test disks are in!  Shown are Inconel, steel aluminum and tungsten.  We will take photos tomorrow under clean conditions before sending on to UMBC.  
  
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10/19/15 disks scanned and mailed to UMBC for testing.  Card came in to test drive Optica last week - James needed to get Mathematica 9 installed to get the CAD port to work.  We had a prelim RFA EDR, full this week - also, Magnetics, Interferometer and Langmuir EDRs on Wednesday and Thursday this week.  Consultants - will send you the presentations, get you thinking about optimization for AM. 10/24/15 First EDRs performed!  Great showing - we will finalize the conventional designs this week for microwave interferometer, Langmuir probes, RFA and magnetics.  Coming up next week: bolometer, HeNe interferometer, more magnetics.  We will soon have enough to start in on first optimization for AM (before APS, I hope!).  This week:

Wednesday, 2pm Final RFA - Quinley

Wednesday 230pm prelim Rogowski - Quinley

Thursday, 2pm Final Microwave Interferometer - Sieck

Thursday 3pm Prelim HeNe interferometer - Stuber

Friday 2pm Final Langmuir, then prelim informal chat-level bolometer - Melnik

Friday 3pm Final Magnetic array/single and prelim Strait design -- Woodruff  
  
11/2/15 here's the EDR schedule for this week:  
Monday 1pm  Final Microwave Interferometer - Sieck  
Monday 2pm Final Langmuir - Melnik  
Wednesday 2pm prelim HeNe - Stuber   
Wednesday 230pm Magnetics - Woodruff  
Wednesdau 3pm Final SPec sheet for RFA - Quinley, Rogowski I.    
  
We should have poster draft by end of this week, as well as the content for the website generated.  
11/9/15 continuation of EDRs this week 2pm -   
Tuesday - Rogowski Final, Microwave interferometer final  
Wednesday - HeNe final, Bolometer initial  
  
Wednesday we will go live with the website updates and reach out to those who have expressed interest in our capabilities.  We will also start to prime the consultants for AM optimization.  Morgan will be leading the activity during APS and after, while the rest of us work on PPPL bank design (mostly).    
**11/16/15 website is live, marketing campaign is 'ongoing' - this might be more person-to person than we first thought.  APS poster coming together - likely we will have a draft in the next day... will keep chipping away at this.**

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--DARPA 4/13/15 ramp up effort – many near term objectives to be met in the next month.  James has compiled Johns code at NERSC. We are ½ time on this**.**4/27/15 We have our code and John’s code running at NERSC.  We have mostly completed Milestones 4  (analytic helicity) and 5 (development plan), and are working on milestones 7 (modified boundaries) 8 (multipulsed) and 13 (design of experiment) – hopefully in the next week should have fleshed those out. 5/4/15 Carlos mentioned that next DARPA Program Manager (Vincent Tang) meeting will prioritize experiment design, so will aim to flesh this out Milestone 13 this week.5/11/15 Milestone 13 almost done (at least first draft), will need to revisit periodically as physics issues get mapped out.  We should be done with uploading all of our preliminary spheromak compression simulations by end of this week (milestone 12).  Looking very interesting!  5/18/15 Have got start cases for compression simulations going, although needing to adjust diffusivity profiles, James has the coil code ported from NIMWSI into NIMJOB. 5/25/15 coil code only working on one proc, so some more effort needed to sort through the code. First CORISCA case for compression concept generated (one fiducial - uncompressed state - need multiple states). Carlos had meeting with program manager last week, much interest in simulations.6/1/15 call planned to review progress. 6/15/2015 - continued to develop the capability for coils (DONE!) and work on the design point for the UMBC device with CORSICA. 6/22/15 next report for Darpa due beginning of August, continuing to make progress on gun design optimization and experiment design.7/6/15 likely to submit 2 abstracts to APS from WSI, talking up a set of slides for the CFSI meeting. 7/13/15 at the Friday meeting we discussed latest simulation results for optimizing the geometry, spheromak compression, and code development for compression.  We also discussed the CORSICA experiment design point, which will bifurcate into small scale and reactor models this week. 7/20/15 James got coil capability ported to John O'Bryan's branch of the code, so we now have compression results with continuity equation and thermal evolution - short paper on verification to follow.  Design point for small device for UMBC was discussed, as well as gun geometry optimization simulations. 7/27/15 we submitted three abstracts on Friday for the APS meeting, so there will be 4 in total from UMBC/DARPA/WSI.  From WSI, they are pasted below at end of this email. 8/3/15 this week need to generate 4 slides for Carlos for his program manager meeting next week 2 on design point, one on synthetic diagnostics, and one on compression simulations.  We will continue to develop content for APS posters on various milestones this week. 8/10/15 still working on slides, APS outlines and now NIMROD team meeting content for this week. 8/17/15 slides sent to Carlos this weekend, although in producing those it seemed clear how much work there is to do for APS.  Will spend a day this week trying to automate the process to get data in the near term. 8/24/15 APS work this week, getting all capabilities 'active'.8/31/15 APS content this week - working on early milestones, getting back into NERSC campaigns. 9/8/15 NERSC campaigns still running, almost got data - need to request some data from John for V&V effort.  Design point needs a full CORSICA model fleshed out that that preserves q during compression (something we just did for Tokamak  Energy).  9/21/15 during the bootcamp last week, we ran the compression cases in anger, getting results by Friday with continuity, temperature (single) and with a nimeq initial condition.  Synthetic diagnostic script was running too.  More work to follow on design point this week. 9/28/15 got stuck on IC with nimeq last week - consumed the time allotted.  Will get with Eric Howell this week and resolve this.  We have data for APS, although, could use this initial condition. 10/5/15 will aim to make progress on all APS posters this week - present first draft on Friday. 10/12/15 have data, but need another pass on post-processing, and on the design point... will spend a day on this this week: almost there!  Eric Howell might be needed for a chat on Friday. 10/19/15 design point iteration needed by Wednesday this week for DARPA extension application.  Also, 2nd pass of data set needed. 10/24/15 design point was discussed on Friday, quite a few questions, so am going to address those on Tuesday.  Chris Bowman is now helping with the data post-processing. 11/2/15 we have data now from runs with nimeq as initial condition, and post-processing from Danielle's routines.  The design point will be iterated one more time this week before putting into APS poster, aiming for 3 poster drafts by Friday. 11/9/15 poster drafts done.  We have data, still need to post-process.  Chris will be in on Friday to help with post-processing.  Talk is on Saturday at NIMROD team meeting (last in the day).  Likely will need to look at data today and relaunch runs.  
**11/16/15 posters presented today - went well, lots of interest, although there is still a massive amount of post-processing to do.**  
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--LLNL PO arrived from LLNL, so Bick’s subk is live.  3/23/15 our Feb 23rd invoice is still bouncing around at LLNL, so this might be a 1 month turn around. 5/4/15 first invoice settled, starting to be 1 month settlement period. 8/3/15 Bick submitted an APS abstract on his work (see below).  
**11/16/15 new PO coming for larger contract.**  
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--Tokamak Energy 4/13/15 Subk from Tokamak Energy was discussed last week.  Awaiting decision today.  2nd proposal on costing was warmly received by Costley, but they already have someone working on this right now… 4/27/15 subk is live, although we are awaiting input still (likely next day or so) 5/4/15 expecting input by Wednesday this week, according to Mikhail. 5/11/15 Peter Buxton has been off sick so there’s a bit more delay. 5/18/15 Peter sent the CAD, and initial conditions, so have got coils programmed and a plasma with about the right shape with CORSICA, will read in passive stabilizers and wall and chamber today, and hopefully get MC coils in.5/25/15 O1-O3 almost done - have defined the initial equilibrium per their example, done vertical stability calcs over small scan in li, and have generated initial fiducials for limited and SX-divertor configurations.  Awaiting time-series analysis now for merging.  There's urgency in this contract right now, since the analysis will define the power supplies (and likely a few other things).6/1/15 had some feedback on O1, although theres much to do refining fiducials in M3 before transport analysis. 6/15/15 some refinement of start cases needed in order to hand off to Tom.6/22/15 still need to follow up onToms suggestions.  likely today / tomorrow. 7/6/15 done with prep work for Tom's time-series analysis under milestone 3.  Will finish up prep for milestones 4 and 5 tomorrow.  They have paid 1st invoice. 7/13/15 Tom has got onto time-dependent analysis, so we are about to send 2nd invoice. The contract performance period ends mid-August, so we are keen to get NF paper draft delivered. 7/20/15 seems the time-dependent analysis depends strongly on the initial condition after merging, so will be spending some time tomorrow on this.7/27/15 spoke with Peter last week - seems like we have converged on the initial condition for end of merging.8/3/15 Tom has generated some time-dependent analysis... getting closer to the deliverables of voltages needed to drive coils.  Just spoke with Peter - he was receptive to a post-deadline poster on this work, so abstract draft is posted below. 8/10/15 still working on voltages, Tom has iterated the transport assumptions.  need to wrap this up this week since the 3 month deadline is upon us. 8/17/15 contract is up - need to produce deliverables today/tomorrow. 8/24/15 Jo Lister is getting involved in this work, although he is not clear on his role just yet.  8/31/15 Tom in, aiming to get to the end of deliverables today. 9/8/15 still not got final deliverables out the door, however Peter shared a cross check between various codes for the inductance matrix we have produced - seems to be about right. 9/21/15 Tom has made progress in the backing out of coil currents from prescribed boundary transport runs (i.e. getting the free-boundary equilibrium solution from the prescribed one).  However, no voltages yet.  We are 3 weeks behind on deliverables. 9/28/15 Tom: "The data in all the equilibrium save files for you post-processing to get the voltages all good. It’s only the first attempt at the backing out that is not correct yet. Working on this." 1 month behind on deliverables. 10/5/15 - got voltages.  Will aim to have more complete dataset today**.**10/12/15 some more thought needed - almost there - we were out by a couple of factors that could be related to cc units. 10/19/15 - finally we got coil voltage deliverables to Tokamak Energy on Friday last week!  I still need to double check the calculations and make sure that they are consistent with analytic (back of the envelope) calculations, then need to write NF paper draft. 10/24/15 final deliverables to go to TE this week. 11/2/15 - we provided data for final deliverables on Friday, still working on APS poster and NF draft. 11/9/15 APS poster 1/2 done, need 2 hours  to put nice figures into place.  
**11/16/15 have pinged Peter and Mikhail for input, will finish the development tomorrow.**  
   
--ARPA-E  5/11/15 still can’t talk about this – there’s an information embargo imposed by ARPA-E.  as soon as I can, I will brief on as-need basis. 5/18/15 Swarthmore was successful, so we are going to help Mike some in the next three months - will see how that evolves, but we have simulation cases running.6/1/15 Mike B is still working through the paperwork with ARPA-E.6/15/15 conference call this morning with Mike, Slava and David. 6/22/15 hifi compiled at NERSC, trying to het some basic cases running. 7/6/15 basic cases running, aiming to get into BC mods shortly (thereby completing first 3 months of milestones). 7/13/15 we realized last week that we didn't have the right version of the code.  With that fixed, we can digest BC mods this week and develop implementation plan. 7/20/15 - digested BC mods needed so have made another version of the lnxmhd code with a new coils case 'tunnelC', compiled it, messing with BCs this week. 7/27/15 found the functional forms for vector potential along the boundaries... just need to translate into logical coordinates this week and compile. 8/3/15 continuing to implement BCs - almost done.  Spoke with Mike B and David S on Friday about next milestones - since ARPA-E contract is live now, they want to move forwards with bank design, and launching simulation campaigns asap (also with NIMROD, since we can do that easily for their case).8/10/15 wasted time last week trying to get the code to run - might have recompiled spheromak.f incorrectly.  gotta get into engineering design this week.  8/17/15 still working on boundary conditions - will need a full day to focus on these.  Once this is running, the work will likely bifurcate.  Engineering design this week too.  8/24/15 aiming to have prelim EDR done before meeting tomorrow, and see if I can implement BCs before then also.Visit from Eric Meier last week was very helpful. 8/31/15 visited Swarthmore to complete engineering design details for bank and coils.  Need to get into presentable form (more drawings to do, and some physics justification). 9/8/15 full EDR almost done.  NIMROD coil case running.  Still need to implement BCs (need a full 1/2 day on this and nothing else). 9/21/15 all OK, although need to get BCs done still - likely this week. 9/28/15 implemented BCs last week - need to make sure they are doing what I think this week. ARPA-E meeting midweek for Mike and David. 10/5/15 meeting went well apparently - in another 2 weeks there's another meeting, will aim to generate results for then. 10/12/15 we have compressing and launching spheromaks with continuity and temperature, although they fly by too quickly.  Will relaunch this week and get HiFI BCs ironed out.10/19/15 we got some great results with NIMROD last week for the ARPA-E meeting in NM, tilting spheromaks in a long tube making flux ropes, but need to press on with BCs for HiFi.  Mike and David seemed content with the progress that they could report. 11/2/15 spent some time in the last week getting the time-advance to work... have resolved some issues, but others keep cropping up.  Have got NIMROD cases running with flux ropes and compression - these might start to inform the engineering design, since the coils might need to be longer. 11/9/15 might need to delegate this for next two weeks to James...  
**11/16/15 - would be so nice to resolve this before seeing Mike and David tomorrow... will stay up and chip away at this tonight.**  
  
  
--Bryn Mawr contract is live.  Need an EDR for a coaxial source in the coming weeks. **10/19/15 likely will schedule for the week following APS.**  
  
--FLARE bank design.   
Hantao Ji wrote last week to see if we would be interested in designing the bank for the MRX upgrade.  I spoke with one of his team there at PPPL - they need a LRC circuit, writing the specs right now so we could likely bid on this when it gets put out to tender in a couple of weeks.  Let me know if you want to help with this - will need to put a small team together (EE, ME and scientists) to respond properly.  Likely to be a substantial (for us) activity, and one of the largest $ contracts we would have taken on (mostly for caps however). 7/20/15 possible core team: me, Carlos, James, Paul and consultants at LaRan.  For fab and test, we may need other core individuals... might explore EHT. 7/27/15 - EHT, LaRann and WSI will likely jointly bid on this, though we are still waiting for tech specs. 8/3/15 UMBC and UW likely to join joint bid also.8/17/15 Have pinged PPPL a couple of times, pinged Hantao again today.8/24/15 seems like Mike is away - specs are almost complete, but they have not yet sent them out. 8/31/15 PPPL has still not released the tech specs, so difficult to know what assistance they need.  Have pinged Andy Zhao.  9/8/15 pinged them all again, let them know we are standing by Mike just wrote back. 9/21/15 No word still.  Have suggested a conference call with Paul M and Paul S. 9/28/15 specs are in - looks doable as a design effort, and a few site visits, iterating a design with PPPL, we are putting a proposal together this week (tomorrow is major think day so we have questions for PPPL). 10/5/15 - we have a small team to respond to this small opportunity (it seems that there is 6 weeks of work in total).  Proposal almost done. 10/12/15 we responded to this opportunity with a solid proposal, and included EHT and a senior engineer from GA. We'll hear from them in a couple of weeks. 10/19/15 Melnik, Sieck and Woodruff joined a video conference call with the PPPL team last Friday - seemed to go well, in that we could answer all of their questions and resolved many of their uncertainties in our deliverables, and in our ability to deliver.  They seemed to value that we would bid on the fab/test/install phase also. 10/24/15 paperwork sent through on Friday last week.  Will get to it this am. 11/2/15 this is live and now had priority in the coming 6 weeks, we have a lot to do.  More on this separately.  Melnik likely to go to PPPL in the next week, armed with questionnaire to get the ball rolling.  I have to look at the breakout of costs, and set up a kickoff call. 11/9/15 cost breakout done, PO issued.  Kick off call with PPPL tomorrow 10am.  WSI call at 9am.  Paul M has a nice looking spreadsheet.  
**11/16/15 site visit went great.  Paul Melnik did an outstanding job of pinning down niggly design details that will save us huge amounts of time.  He debriefed us today, adn Frank Hoffman debriefed us also in an email.  Immediate, urgent action items are to get PSpice running and have a first cut of all of the banks running, as full banks so we can ensure the mutual inductances are being modeled correctly.  Having the time-history of the shot would also be useful asap - we should make sure that all of the things that they said they would provide are obtained immediately - perhaps Paul M can follow up with them Tuesday and Wednesday and bug 'em.  James can get PSpice running Tuesday and case library started.  Then switch gears to logic map for controls asap.**