



LET Work at SLAC and Plans for the Future

PT
SLAC



Recent Activities at SLAC

- Lucretia – code development and benchmarking
 - **Notes on other ILC simulation codes**
- **Wakefield calculations (not discussed here)**
 - **LRWFs: Cavities to RF units**
 - **SRWFs: Collimator Wakefields**
- Area system simulations
 - **RTML – see separate talk on RTML status**
 - **BDS**
 - **ATF2 (not discussed here)**
- Plans for the Future



LET Codes -- Lucretia

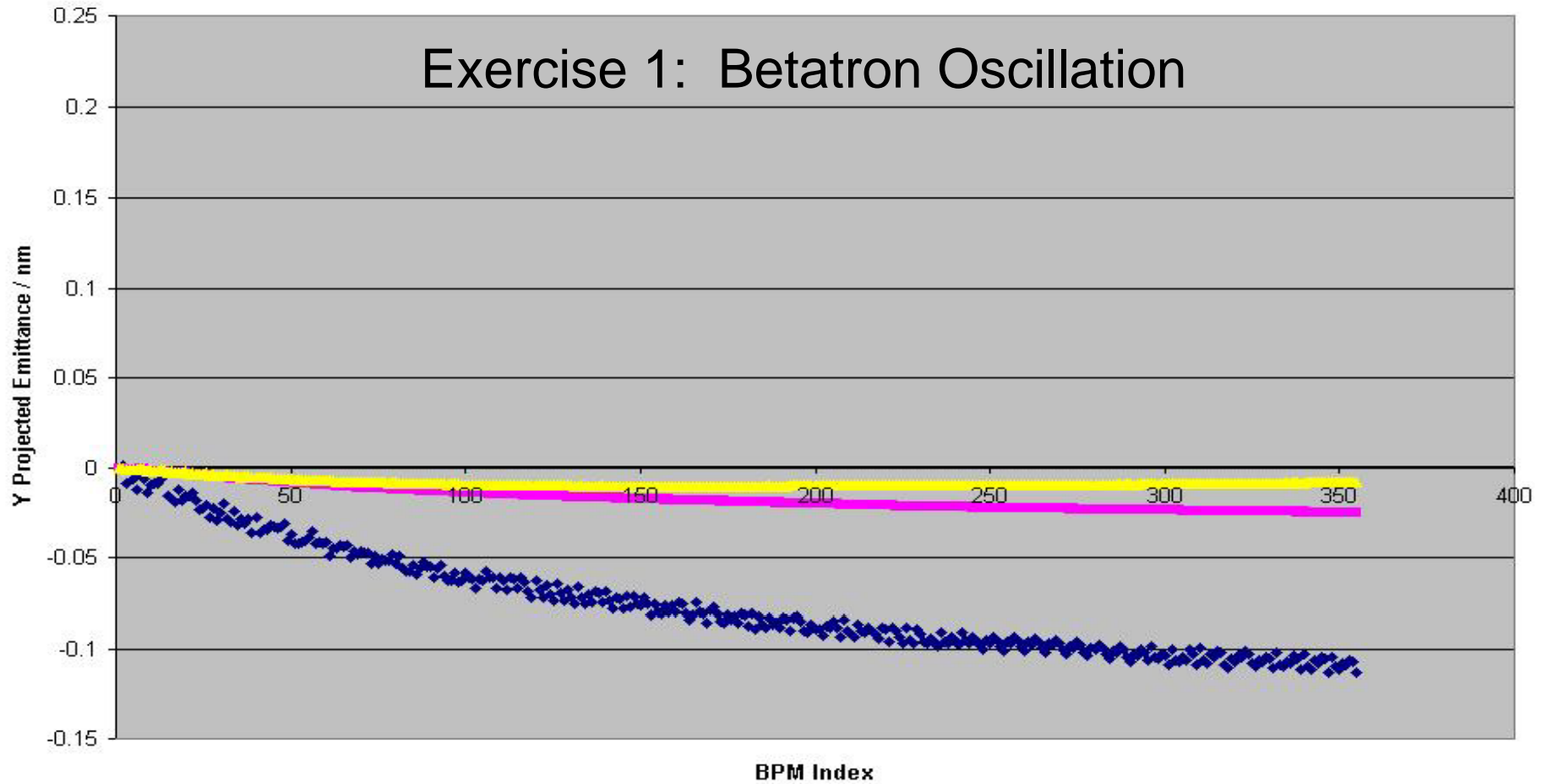
- Under active development and maintenance
- Rapidly growing user base
 - **IE, I think there's 5 of us now!**
- Recently ran through Main Linac benchmarking exercises, results look good
 - **See next slides**
- Possible features in the near future
 - **Beam-beam via GP interface**
 - **Improved interface with ground motion via MATGM**
 - **IR magnets embedded in detector solenoid, or**
 - **Field map tracking**



Lucretia benchmarking

Sum Betatron Y Emittance, wakes on

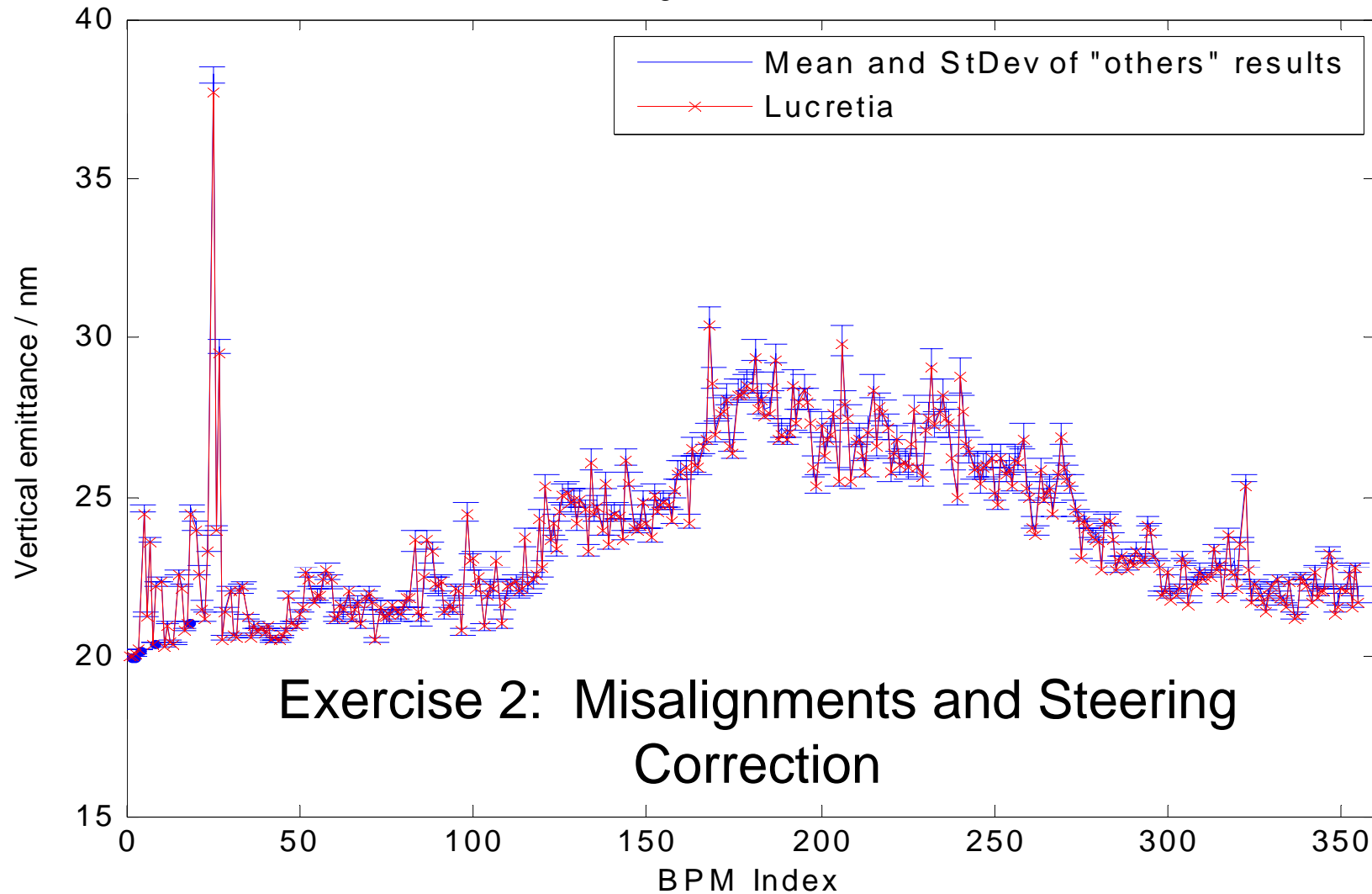
◆ Steve-Kirti ■ Steve-Nick ▲ Steve-Daniel





Lucretia benchmarking (2)

DFS with PT set misalignment and correctors and wakes



Exercise 2: Misalignments and Steering Correction



Other LET Codes

- DIMAD

- Frozen

- Occasional bugfix releases, no new features or development

- LIAR and mat-LIAR

- Frozen

- No active development
 - Might do bugfixes if bug reports are received
 - Then again, might not!
 - Is anyone still actively using LIAR or mat-LIAR?

Best features in LIAR and DIMAD incorporated into Lucretia

Greg White: “You really ought to throw out your codebase every 10 years and start fresh.” There’s something to that -- after 10 years, LIAR had accumulated a lot of half-baked and poorly-implemented features and ideas.



Other ILC Codebase – XSIF Parser

- Still maintaining and using XSIF parser for lattice files
 - **25 year old plate of FORTRAN spaghetti**
 - **Ripe for replacement**
- Universal Accelerator Parser (UAP) looks like a nice alternative
 - **Backwards-compatible with MAD-X, MAD-8, BMAD languages**
 - Could add SAD format, maybe (ugh) TRANSPORT?
- Should ILC APY get involved in this issue at all?
 - **Presumably at some point ILC GDE needs to have a full repository of lattice files under revision control**

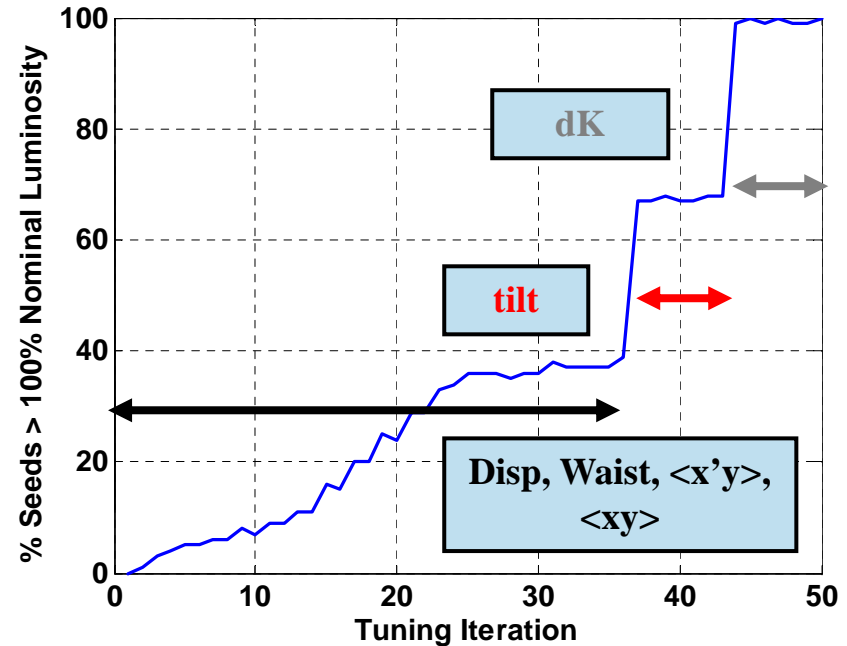
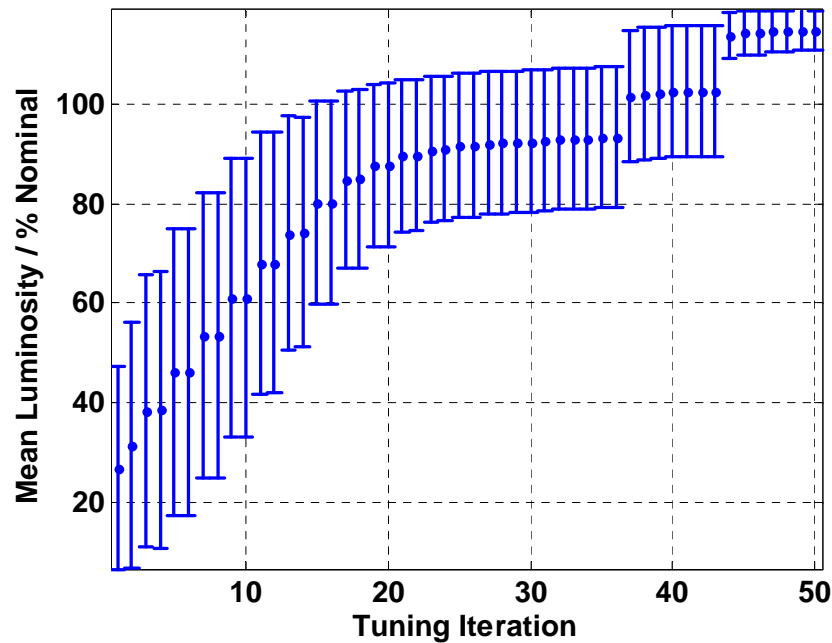


BDS Progress

- BDS simulation work
 - Start with beam-based quad, sext, octupole alignment
 - Proceed to knob tuning
 - Include 5 Hz orbit feedback
 - Use GP to get actual luminosity
 - Only one side of BDS so far – collide beam with antimatter version of itself
 - All 100 seeds get at least the design luminosity!
 - Assuming that RTML and ML do not exceed their emittance budgets . . .
- Vibration of QD0 cryostats
 - Lumi loss through beam-beam offset and beam size increase
 - Offset handled (eventually) by intra-train FB
 - Beam size increase dominates
 - Push-pull → 2 cryostats per side
 - QF1 cryostat vibrations ~uncorrelated with QD0 vibrations
 - Tolerance seems to be ~100 nm



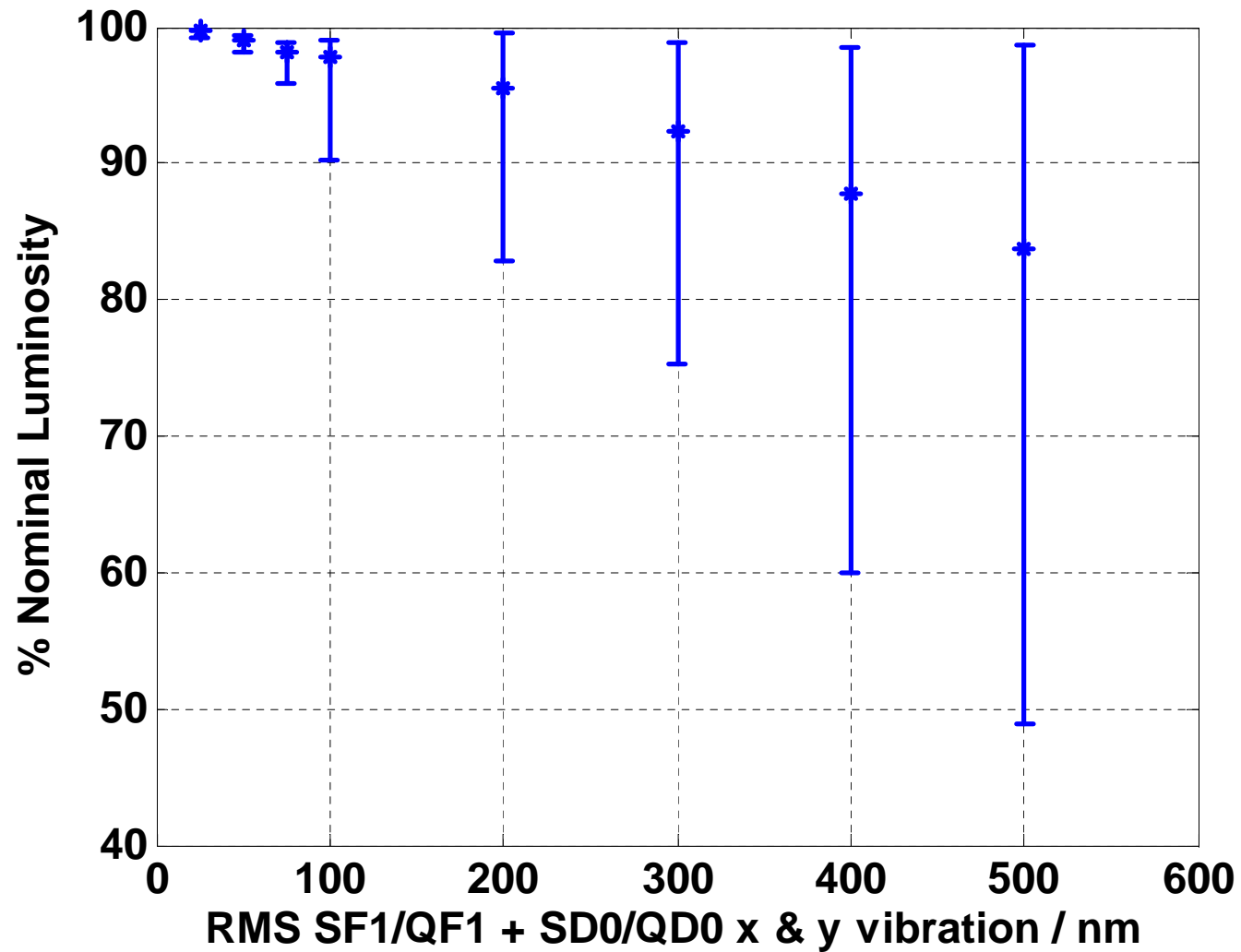
BDS Tuning



Two views – effectiveness of tuning sextupole mover knobs (dispersions, waists, couplings), then sextupole strengths and tilts



SC FD Vibration Tolerance





Into the ED Era at SLAC

- Recently made a plan for US-LET work for US FY 2008-2009
 - **Nikolay is in charge, I'm his deputy**
- Plan activities (SLAC participation indicated in *italics*)
 - **Lattice design with engineering input**
 - ***Wakefield work via advanced computing and maybe some theoretical calculations***
 - ***RTML emittance studies***
 - ***ML emittance studies***
 - ***S2E studies***
 - ***Code development***
 - **Vibration and alignment studies**
 - **Support of US test facilities**
 - **SC quad and cavity BPM engineering**
 - Actual building of objects!
- Note: BDS LET work in US still carried under BDS management, not LET management



ED Era at SLAC (2)

From the ART FY08-09 proposal, subject to government approval

Topic	FY08 FTEs	FY09 FTEs
WFs	2.0	2.5
ML	0.5	0.5
RTML	0.75	1.0
S2E	0.5	0.75
Code dev	0.25	0.75
Total	4.0	5.75



ED Era at SLAC (3)

- Where will 4-6 LET FTEs come from?
 - **Wakefields:**
 - Karl Bane, Andreas Kabel, Zenghai Li, Cho Ng, Liling Xiao
 - **All the rest**
 - For sure: Andreas Kabel, Steve Molloy, PT, Mark Woodley
 - Possible: Sergei Seletskiy, Jeff Smith, Glen White
 - New post-docs?
 - Note that PEP-II operations end on the last day of FY08
 - Some members of accelerator department may join ILC LET effort
 - **Partially depends on demands of other activities**
 - Not easy to plan for the future, but --
 - “If you can’t take a joke you shouldn’t have signed on!”



Questions / Comments?



“Give me sunshine again,
You’ve left me in a mess
And when I fall I really fall,
And that’s when you go to my head, my head...” - Love and Rockets