

CRYOPROBES
AND MONEY
AKA LOSING MONEY



Our cryo/cold hardware

- Bruker 500 CPDUL (March 2004)
 - ^1H 2800, ^{13}C 1400
- Varian 600 triple resonance (July 2005)
 - ^1H 4700
- Bruker 800 TCI (September 2005)
 - ^1H 8750; ^{13}C 1100
- The impact on scheduling and work flow has been more dramatic for small molecules than for macromolecules

Cryoprobe operating expenses

- Cold head service
- Vacuum pumps
- Other hardware
- Probe itself (these 4 could be covered by service contract, ca. \$26-\$31K/year)
- Electricity
- Water
- Ultrapure helium
- Put another way, it's as expensive as running an 800 for a year, quite a bit more expensive than running a lower field instrument

Our approach to financing cryoprobe operation

- Hourly surcharge on top of hourly charge for using the instrument
- Uniform rate of \$4/hour on spectrometer charges ranging from \$3 to \$7/hour depending on the instrument and the time of day

Is this a good deal for small molecule users?

- From my perspective, it is a good deal for any but the shortest experiments, e.g. a simple proton
- ^1H spectra cost more but the absolute amount of money is small, and quality is high
- Overt user reactions to increased charges was initially negative, even for organic samples, the **best of all possible worlds**

Is this a good deal for macromolecule users?

- High sensitivity experiments like HNCO aren't compressed, because the length of the experiment was set by phase cycling, not sensitivity in the warm probe. So they cost more than before, considered in isolation
- The full suite of necessary experiments includes several that are low sensitivity; many compress quite effectively to 1 phase cycle, ca. 27-32 hours instead of ~3 days. 11-12 days will give what used to take 21 days, for about the same cost. In that case, if there are more proteins to do, nobody loses

Fast methods for macromolecules

- This is somewhat speculative, because we haven't tried these yet, but the high sensitivity of the cryoprobe should work very well with shortened acquisition methods
- Now facilities need to hope there ARE more proteins to be done, because otherwise users save money, facilities lose revenue

Cryoprobe and small molecule automation: the dream

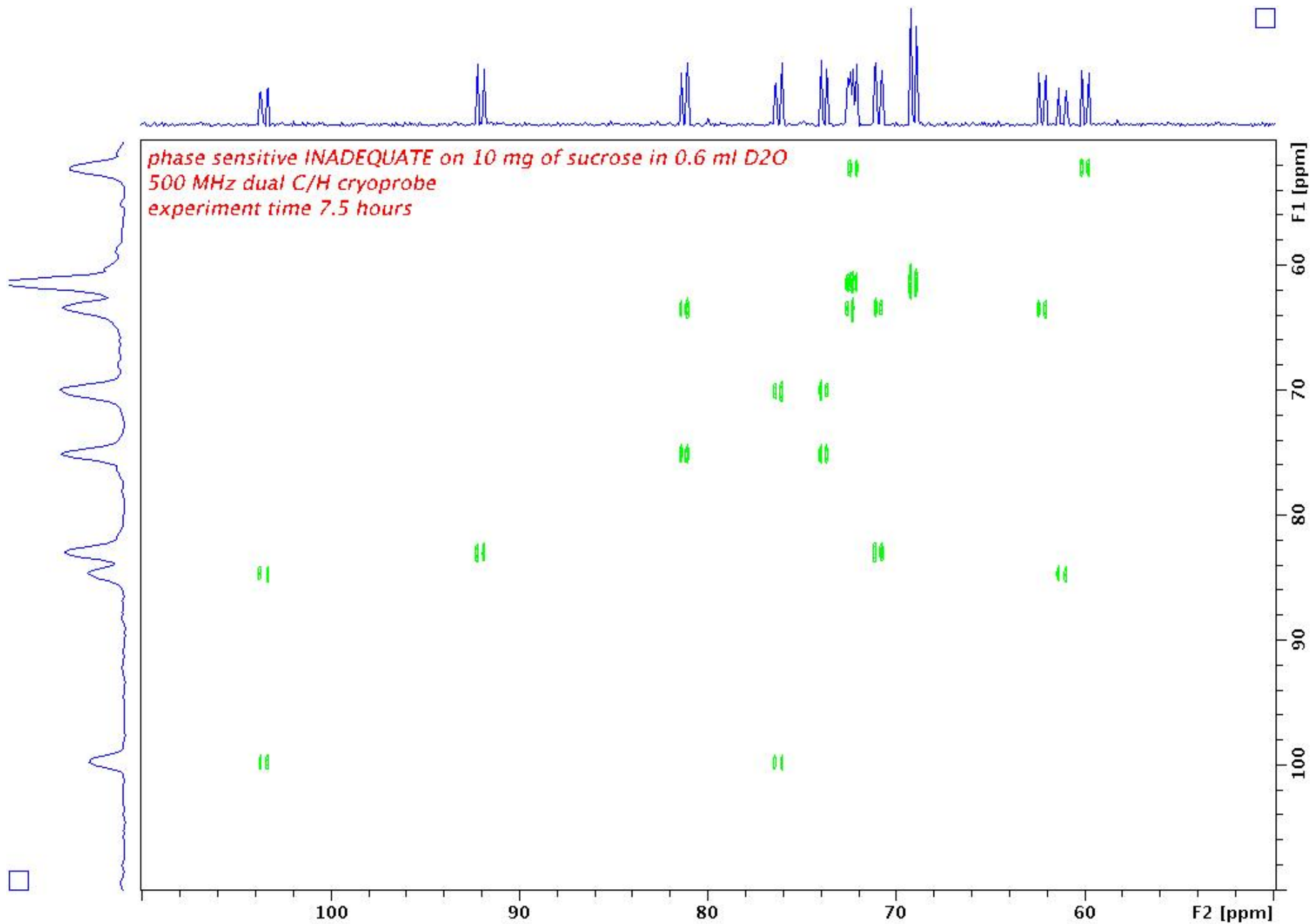
- Capture 24 hour productivity and change samples as frequently as desired at any time
- Avoid having users load their own samples into the fragile probe
- Direct delivery of results to requestor by email typically within 2 hours
- Streamline the queue for walkup use

Cryoprobe and automation: the reality

- Popular with a subset of users; the majority use it infrequently or never
- Most often used to generate data that is needed as part of an analytical package but not for time sensitive results
- Users want their data plotted/integrated/peak picked in a very specific way, and ALWAYS reprocess their data

How have small molecule users adapted to the new opportunities?

- Chance to run really low sensitivity experiments like INADEQUATE, which become widely practical now (see next page): no
- Grinding out ^{13}C spectra on small, previously impractical samples: yes (if this means the compound does not have to be resynthesized, it is a huge labor savings for the chemists)
- Inflation of S/N threshold users consider satisfactory: yes (this is where we are making back the most lost income)



Are we getting higher quality
results?

- YES

Has our income risen in
proportion to our new expenses?

- NO