ERT, Glue, and Scheduling : present and future

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What is ERT?

* Answers : "If I give you this job right now, how much time will elapse before it starts to execute?"

* Note : asking the **right question** is important!

Approaches

* "formula"

* simulated

* historical

* statistical

* "binary"

Approaches

* "formula"

* simulated

* historical

* **statistical**

* "binary"

Statistical

* No history

* No "formula"

* Simple calculations

Copernican Principle
"Your position is not special"

* Due to J.R. Gott

* Used in wide variety of cases

  * Fall of Berlin Wall

  * Runs of Broadway plays

  * predictions of "lifetimes" of dictators

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Copernicus method and Doomsday theory [edit]

Gott first thought of his "Copernicus method" of lifetime estimation in 1969 when stopping at the Berlin Wall and wondering how long it would stand. Instead of extrapolating a set of developments in world geo-politics (futurology), Gott used his relative ignorance to his advantage by saying that the Copernican principle is applicable in cases where nothing is known; unless there was something special about his visit (which he didn't think there was) this gave a 75% chance that he was seeing the wall *after* the first quarter of its life. Based on its age in 1969 (8 years), Gott left the wall with 75% confidence that it wouldn't be there in 1993 ((8/.25) + 1961).

In fact, the wall was brought down in 1989, and 1993 was the year in which Gott applied his "Copernicus method" to the lifetime of the human race. His paper in Nature was the first to apply the Copernican principle to the survival of humanity; His original prediction gave 95% confidence that the human race would last for between 5100 and 7.8 million years. (Brandon Carter's alternative form of the Doomsday argument was delivered earlier that year, but Gott's derivation was independent.)

He made a major effort subsequently to defend his form of the Doomsday argument from a variety of philosophical attacks, and this debate (like the feasibility of closed time loops) is still ongoing. To popularize the *Copernicus method*, Gott gave *The New Yorker* magazine a 95% confidence interval for the closing time of forty-four Broadway and Off Broadway productions based only on their opening dates. He was more or less 95% correct.
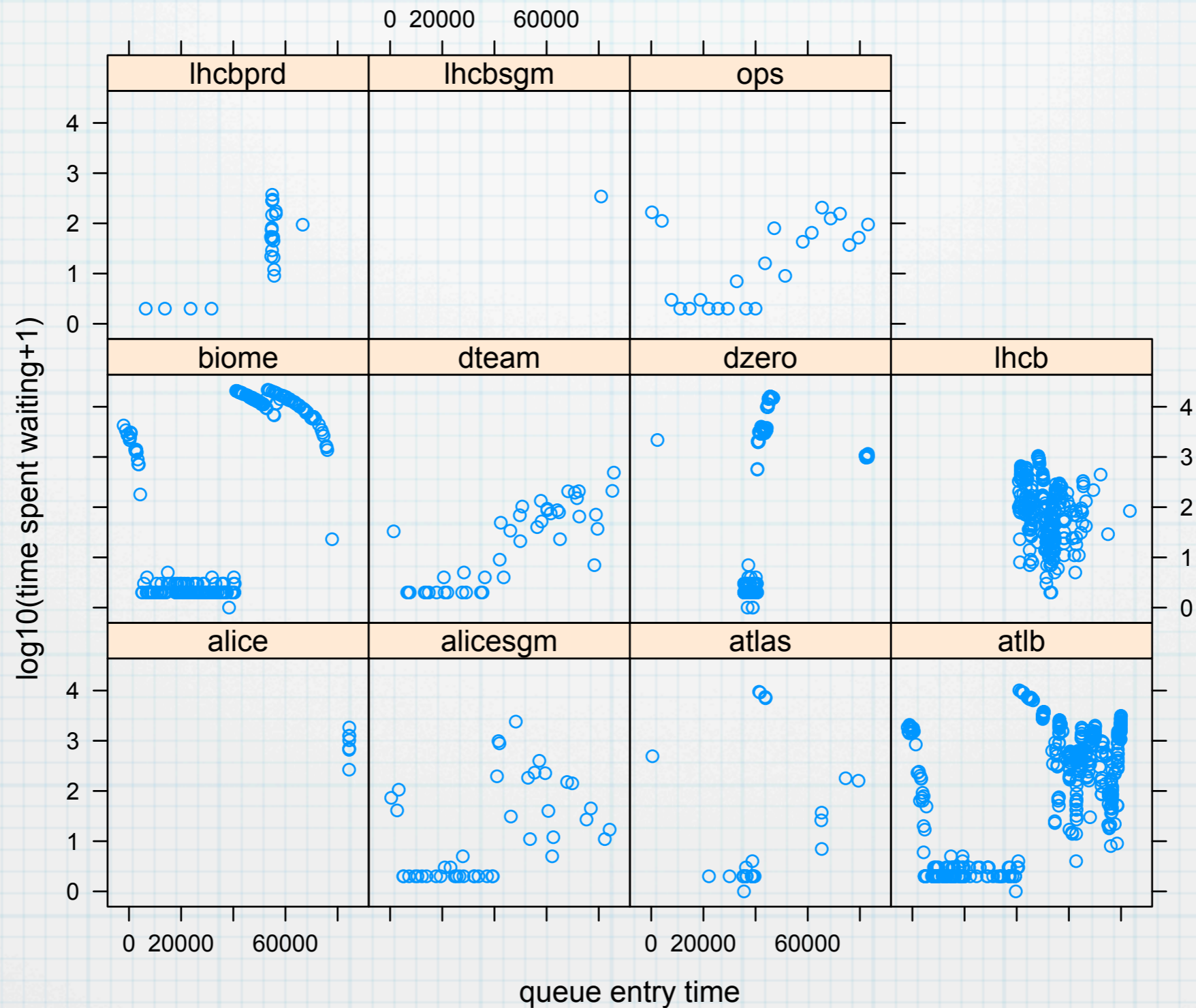
Copernican ERT

* Your position is not special, so:

  * if jobs are waiting for your VO/queue, you will wait as long as they have

  * if no free CPUs, and you have no jobs waiting, you will get next core (q: "how long since last free core?)

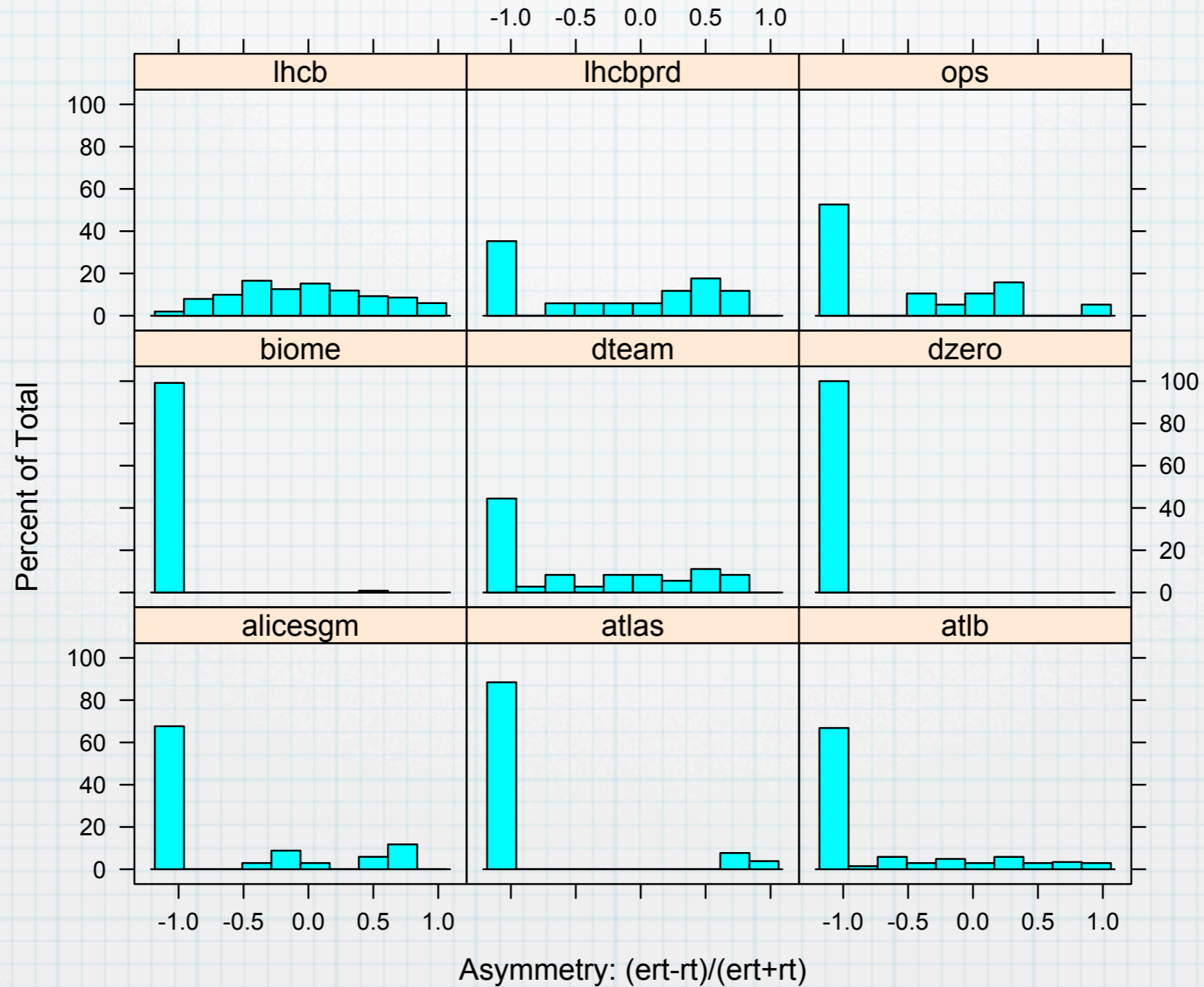 * if free CPUs, and you have no jobs waiting, your job will run immediately

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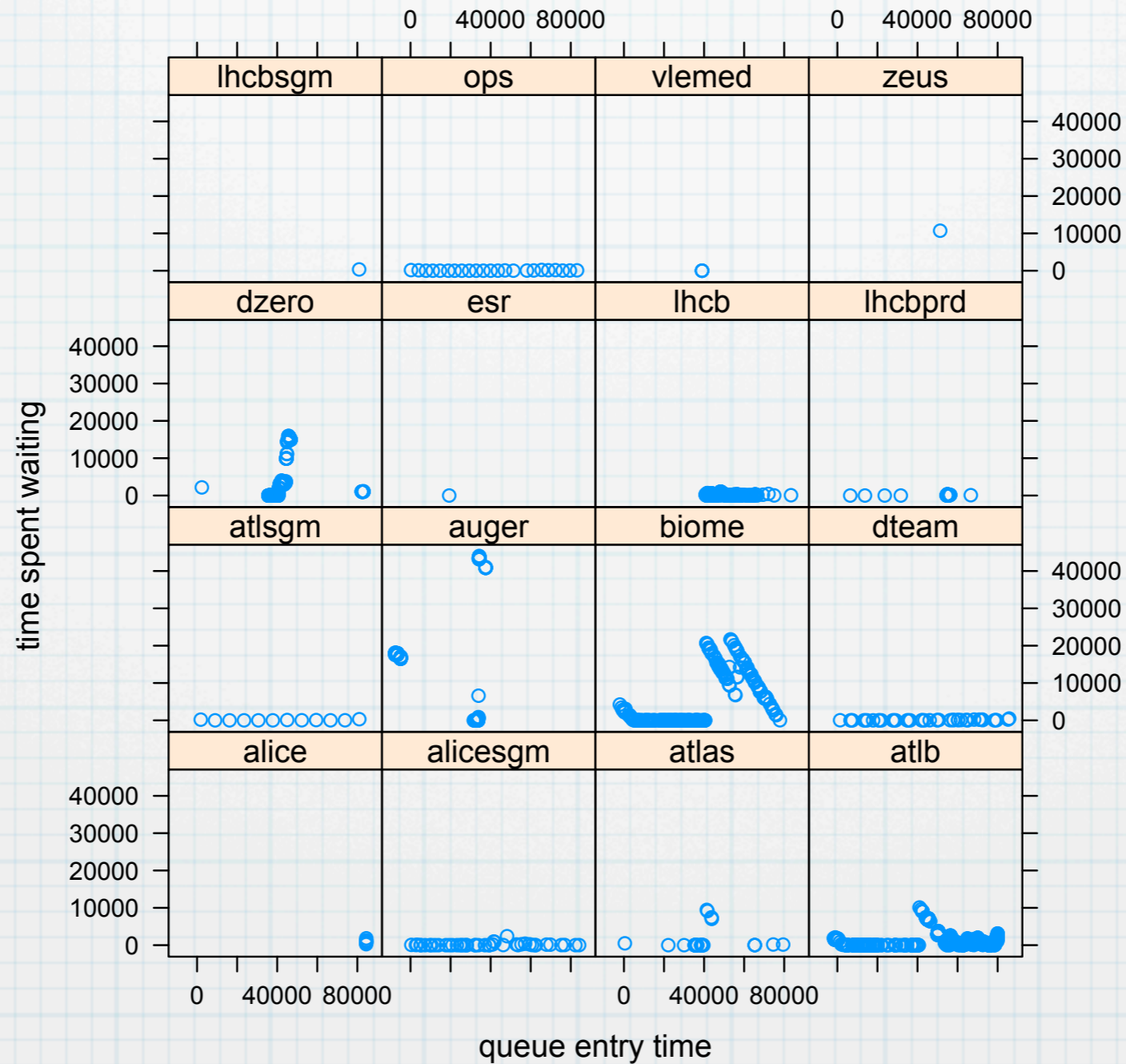
log scale, subset of VOs

results, wait < 120 sec

Waits < 120 sec, Copernican
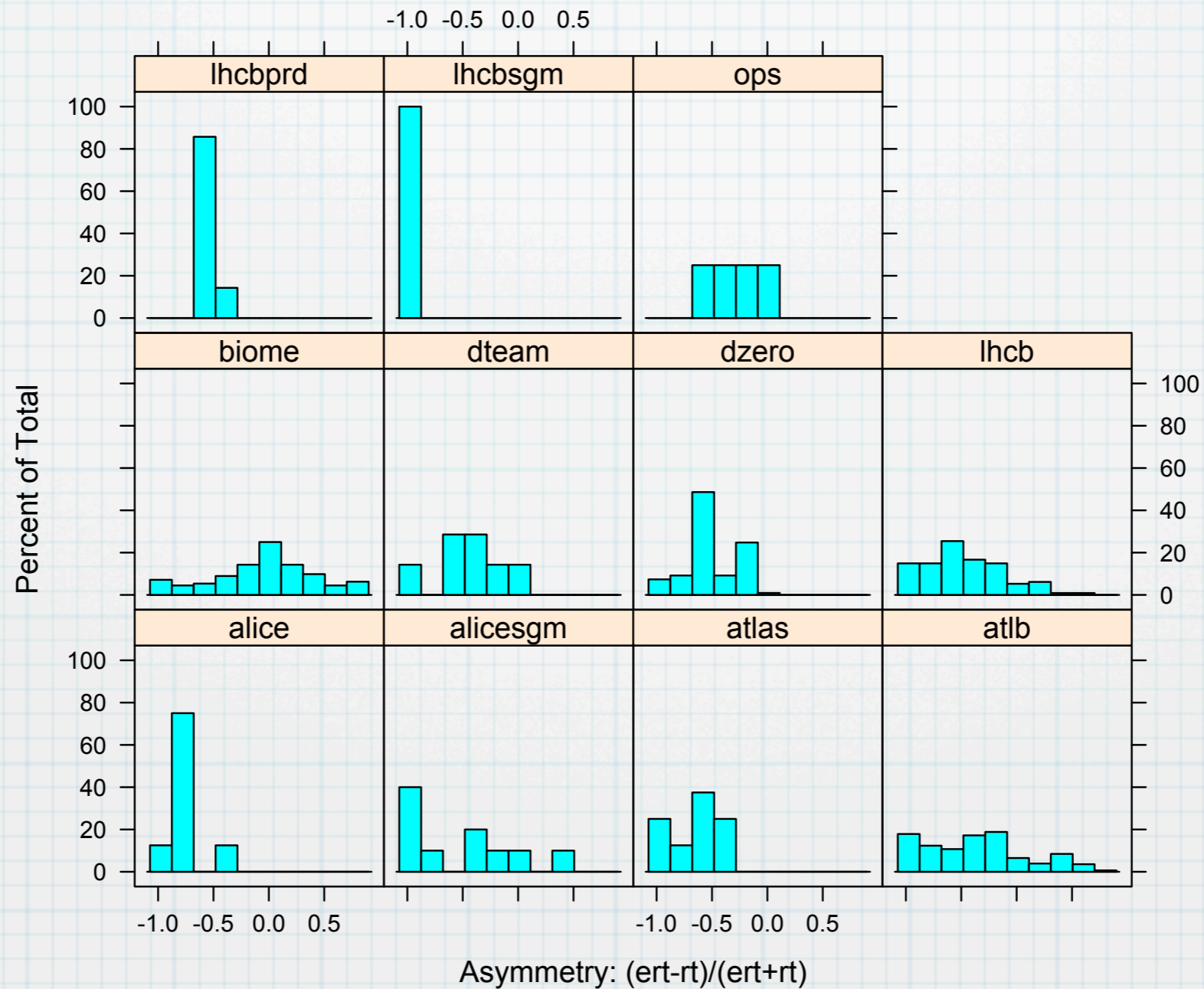
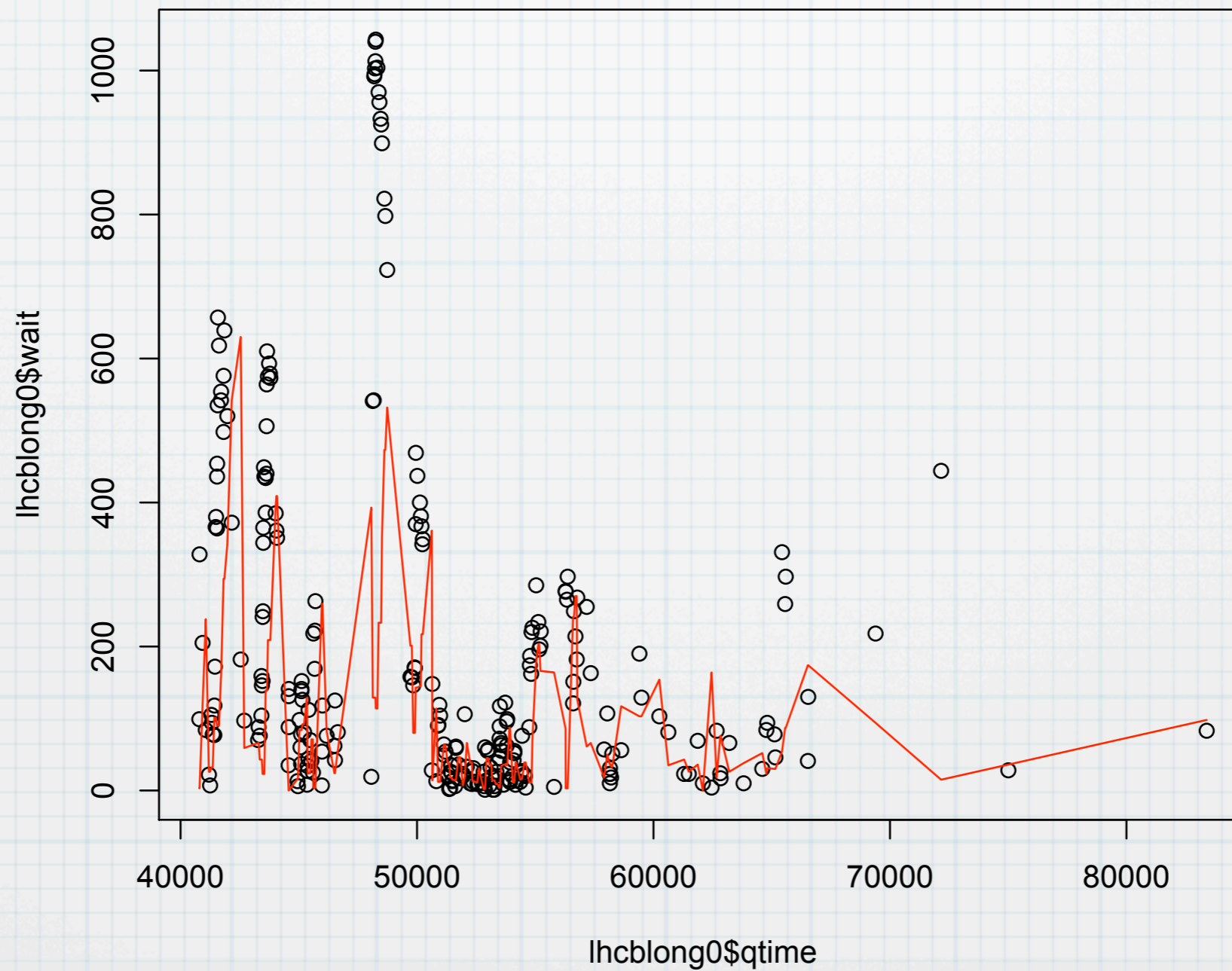# results for longer times
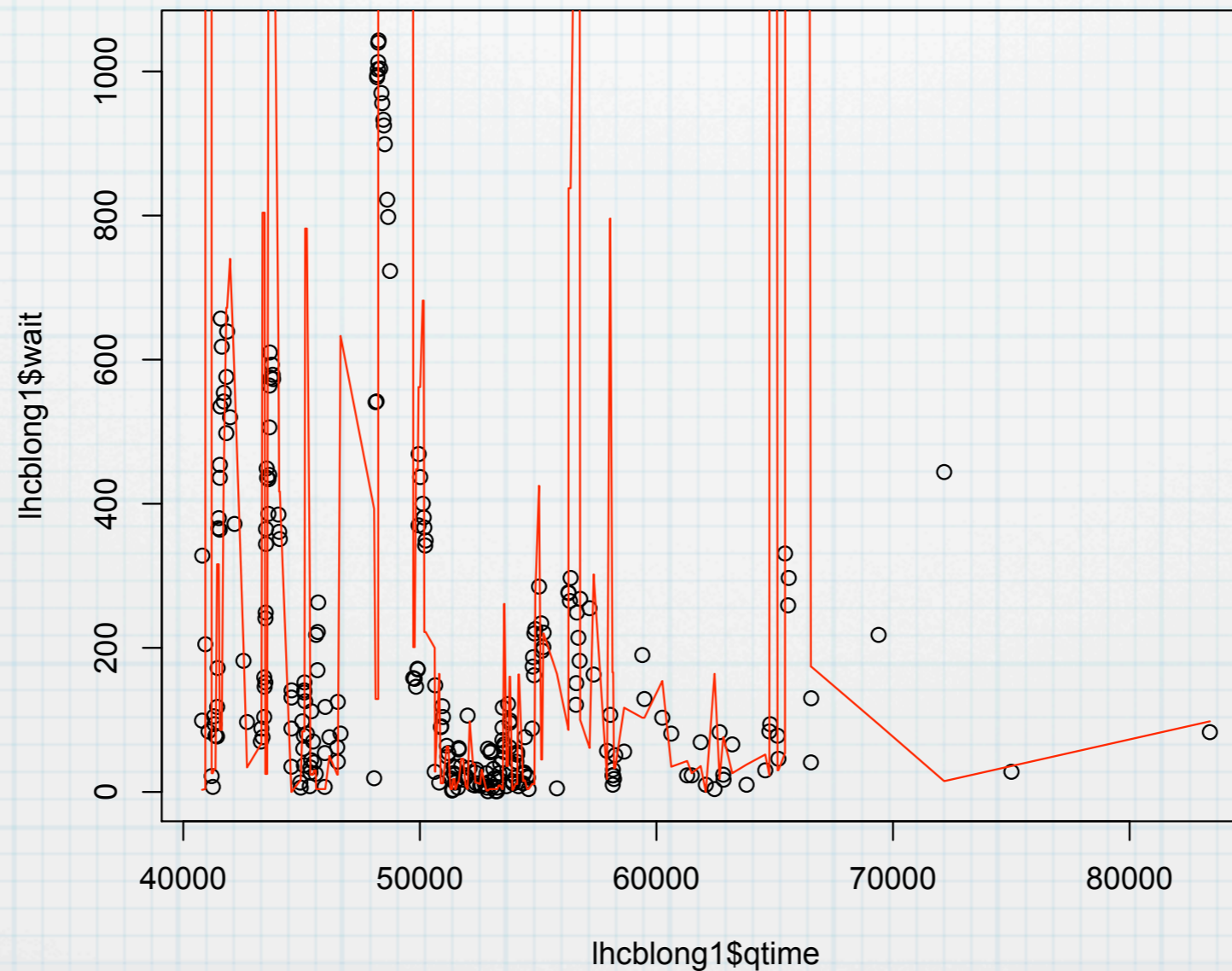

Waits > 120 sec, Copernican

ert/rt vs. time

assessment

* fine for steady state

* special cases :

  * queue empties after being full, not bad

  * jobs suddenly start queuing : **bad**

* special cases violate assumption, and are also interesting ...

* It used to be much worse!

Future 1

* **there is work on a better algorithm**

Development Roadmap

* fix bugs!

* new backend (sqlite?) -- current perf limit is searching over job lists

* new algorithm

Future 2 : missing Glue

* Q : how many jobs can I give you?

* now : can only judge by watching info sys ...

  * gradual increase in ERT (as just shown)

  * latencies of info sys (order 10 min)

Possible Good Questions

* how many jobs could I give you at current ERT?

* how many slots could I get?

* how many more slots could I get?

* note : freeCPUs should always be zero!

Conclusions

* Current ERT is "OK"

* does worst at most interesting case

* the really interesting case[*] cannot be represented in the info sys!

[*]for hep-like workflows