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Block Normal: A Change Point Analysis for Burst Gravitational Waves

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Block Normal...

- What is it?
- How does it work?
- How well does it do?
- What's next?

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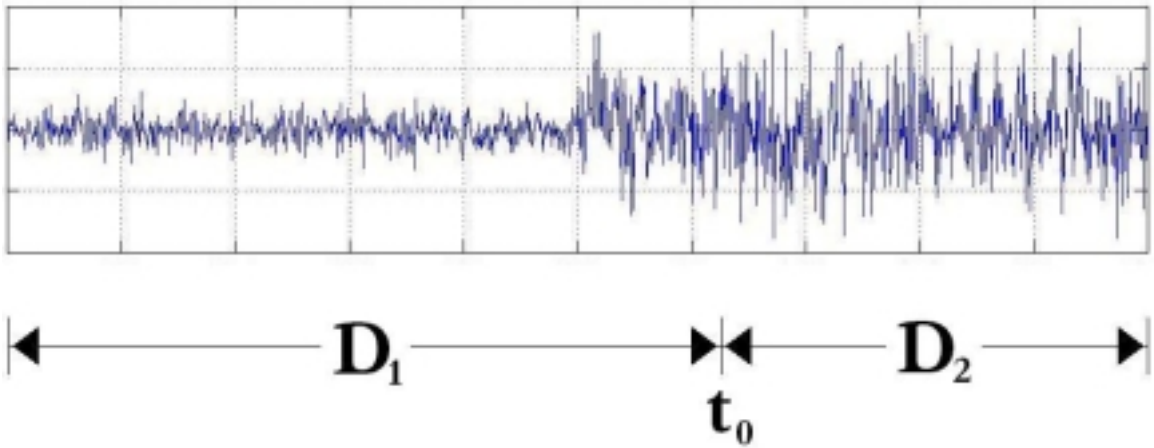
What is a "Block Normal" Analysis?

- Seeks the onset of a GW signal by looking for a change in statistics of the detector output.
  - » Block: divide data into blocks where statistics are approximately constant
  - » Normal: characterizes statistics in block by mean and variance
- When a signal is present, the variance of the detector output must change (although the mean may not).
- Block Normal looks in an unprejudiced way at the data
  - » Assume nothing about GW properties: e.g. waveform, spectrum

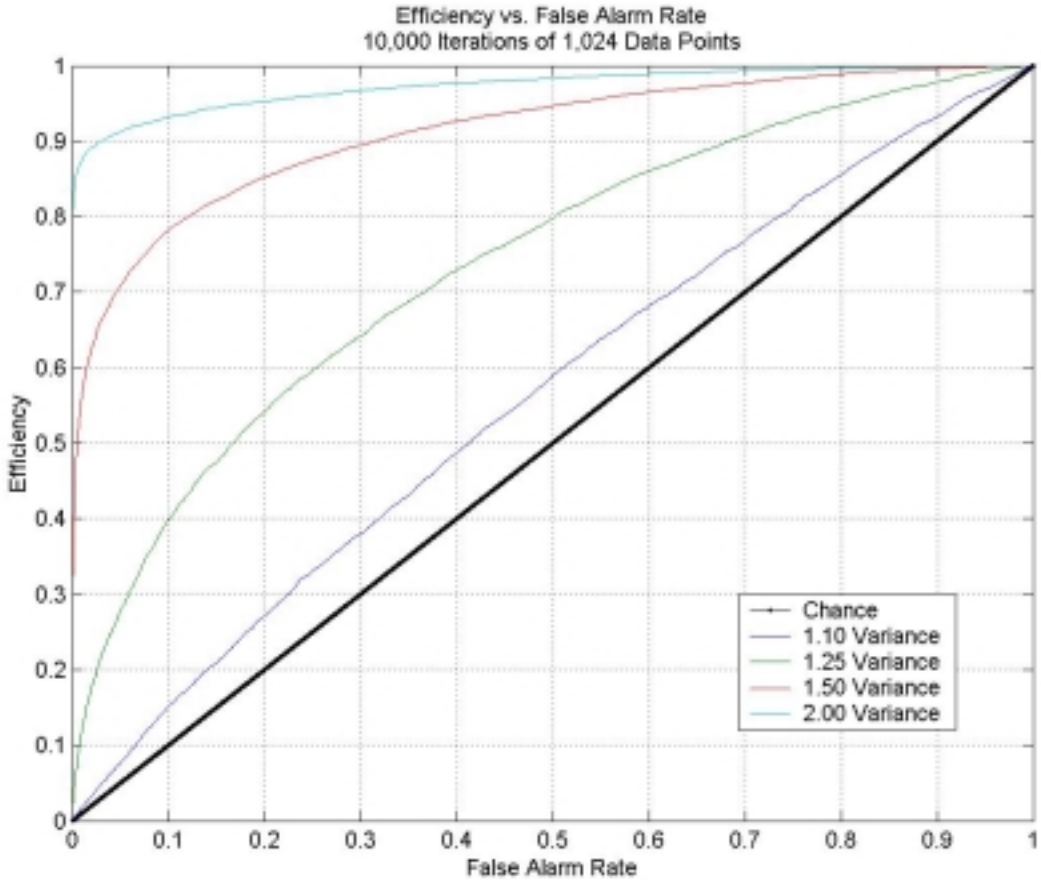
How Does it Work?



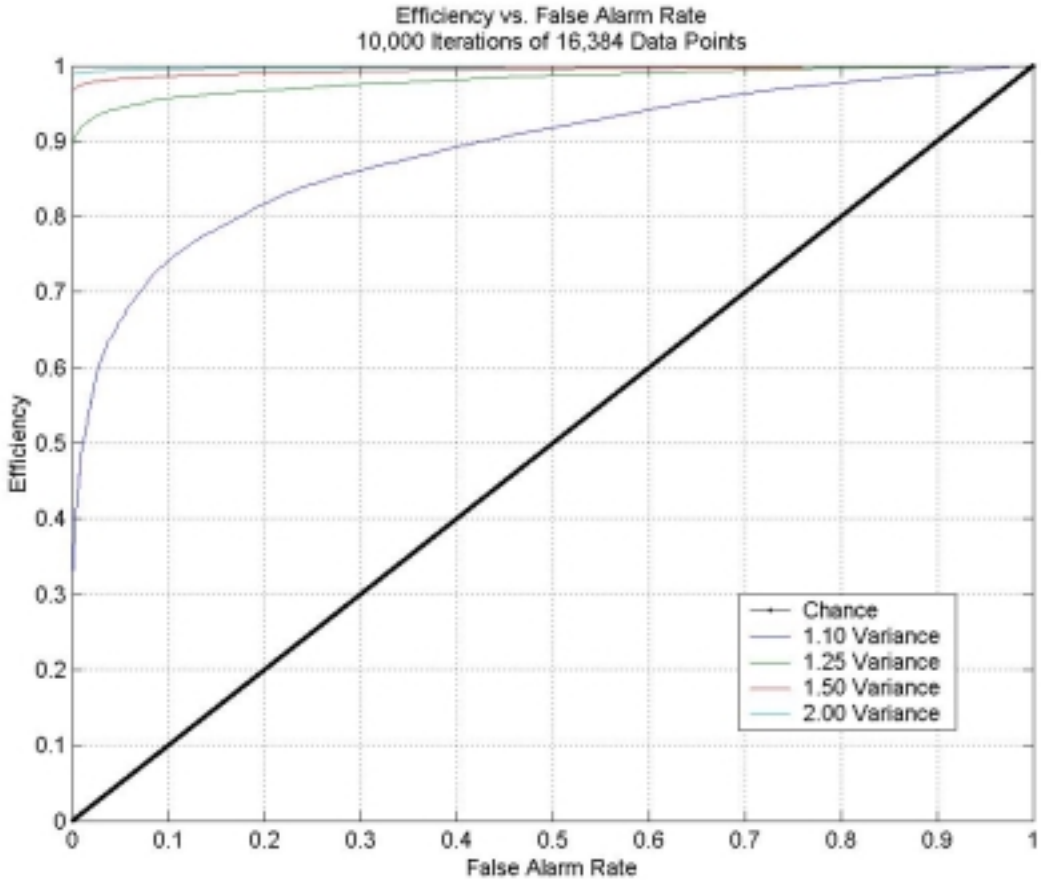
$$P(D) \equiv \int P(D \mid \mu\sigma) P(\mu) P(\sigma) d\mu d\sigma$$

$$\rho_2 \propto \frac{\sum_{t_o} P(D_1) P(D_2)}{P(D_1 + D_2)}$$

Efficiency vs. False Alarm Rate
1,024 Data Points



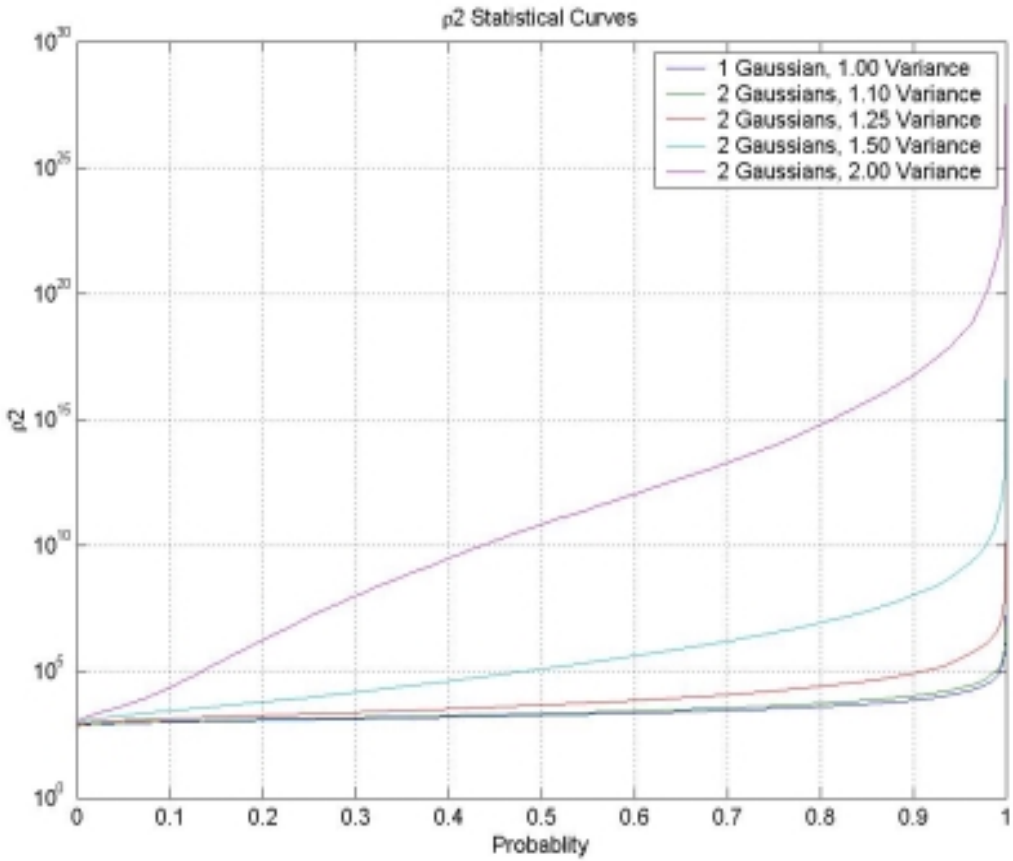
Efficiency vs. False Alarm Rate 16,384 Data Points



What's Next?

- Apply to S1 data
  - » Already part of LAL
- Investigate sensitivity to different kinds of bursts
  - » Mock data challenges
- Investigate utility as detector diagnostic
  - » New DMT monitor?

Statistical Curves



Picking Out Change Points