

A New Approach To Acute Alarming in Continuous Air Monitors

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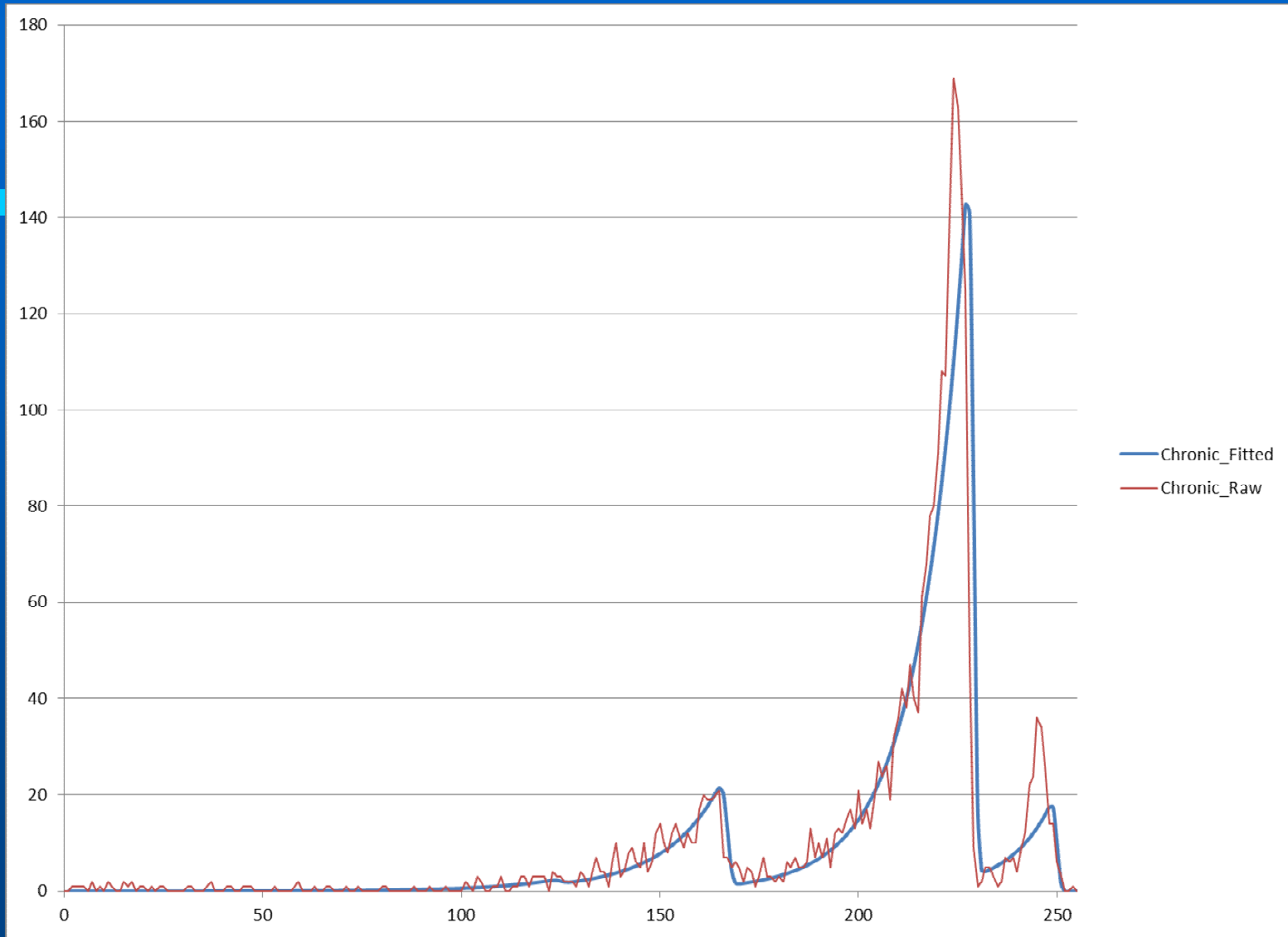
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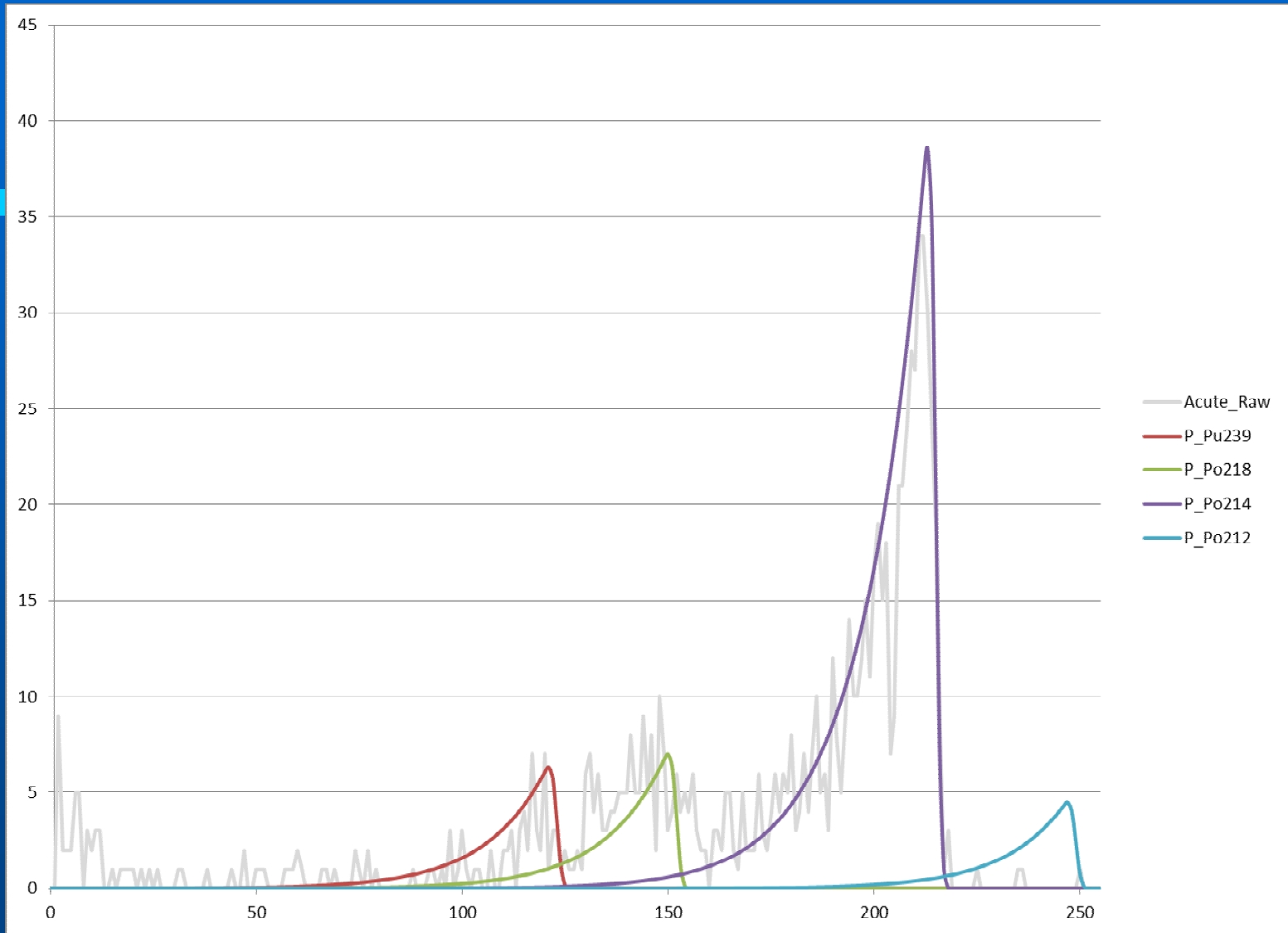
Introduction

- **Historical approaches in alpha CAMs**
 - Count rate
 - ROIs
 - Tail Fitting
 - Alpha peak shape fitting
- **Current state of the industry**
 - APSF
- **Areas of improvement**
 - APSF produces high variances when fitting sparse spectra

A Bayesian Approach

- Alpha-peak-shape-fitting (APSF) of the chronic spectrum provides a basis for the ‘prior distributions’ needed for a Bayesian-based algorithm.
- A probability is assigned to each alpha count and alarming is based on cumulative Isotope-of-Interest probability.





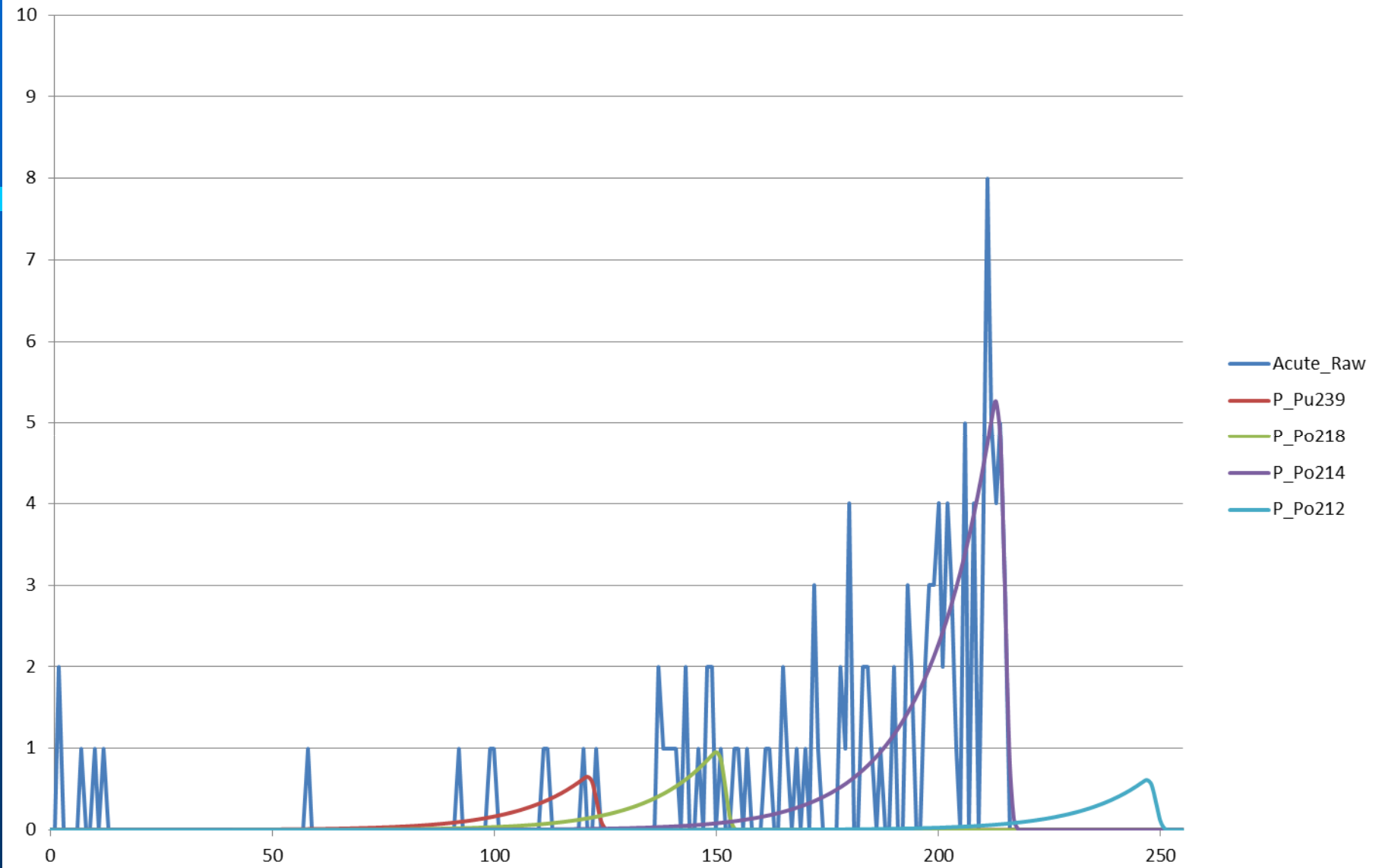
Refine the investigation

- As each count is received, use the chronic distributions to assign a probability of the count being RDP or lol
- Sum the discrete probabilities for each isotope to estimate total isotope counts
- Simulate using Excel
 - Generate a 'recording' of counts received from the MCA.
 - Import the data into Excel and play back.

Channel	P_239	P_218	P_214	P_212
115	0.8279	0.1587	0.0132	0.0002
152	0.0000	0.8489	0.1493	0.0018
213	0.0000	0.0000	0.9877	0.0123



- $$p(\mathbf{i}) = \sum P_i(\mathbf{c}, N)$$



Sensitivity?

- Assume background is composed of the tail contributions of the RDP
- MDA is then
$$MDA = 4.65 \times Bkg$$
- Can we alarm on 15 counts in the presence of radon progeny?

Conclusions

The Bayesian approach appears to have some potential.

- It is much less computationally intensive**
- Traditional statistics for evaluating MDA can be used**
- Faster alarming is likely**
- More evaluation is needed**

FOR MORE INFO...

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