

# First Data from the ${}^6\text{He}$ -CRES Experiment and Future Outlook

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2021 Fall Meeting of the APS Division of Nuclear Physics



# Table of Contents

- 1 Review of Data Acquisition
- 2 Data Analysis With Katydid
- 3 Future Outlook



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# Source

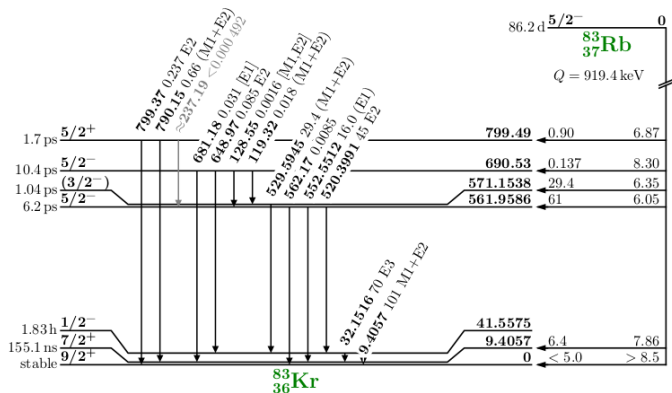
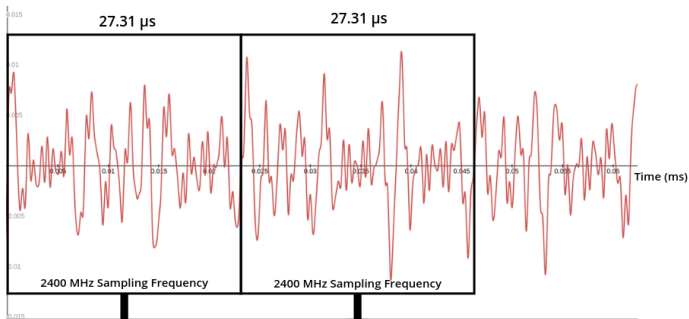


Figure: E.A. McCutchan, Nuclear Data Sheets for  $A = 83$ , Nucl. Data Sheets 125 (2015) 201.



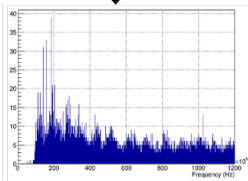
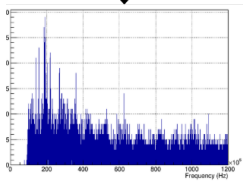


2<sup>16</sup> samples

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PFB/FFT

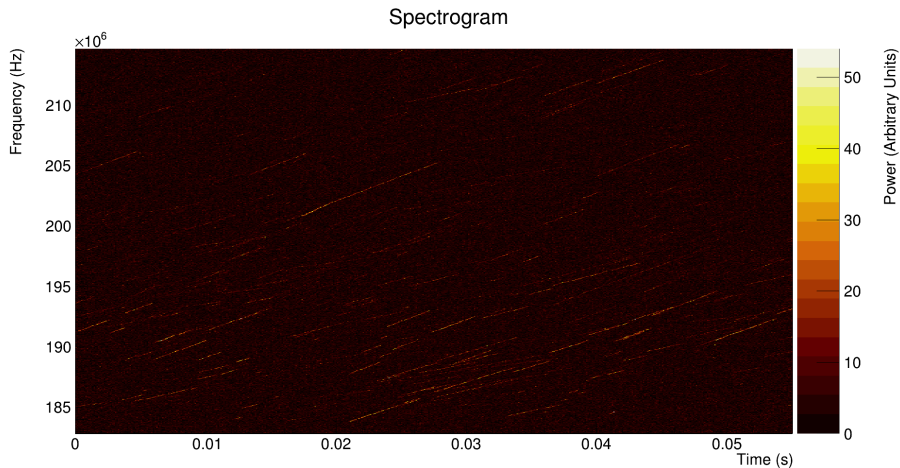
PFB/FFT



36.62 kHz Resolution Frequency Spectra



# Our First $^{83}\text{Kr}$ Data!



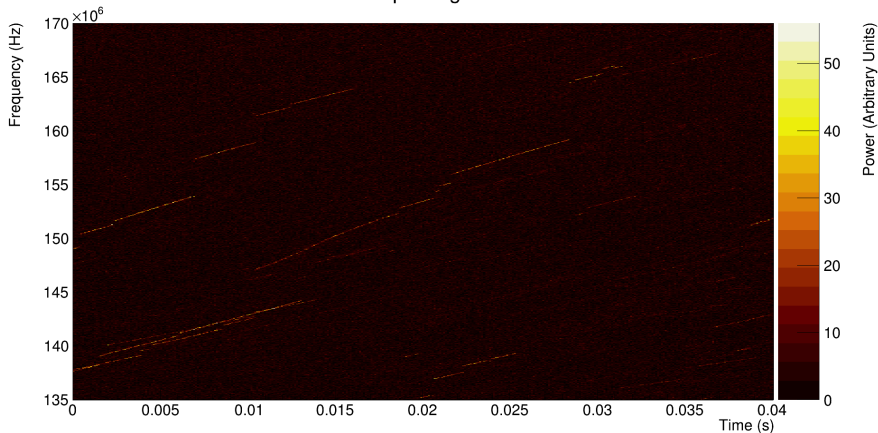
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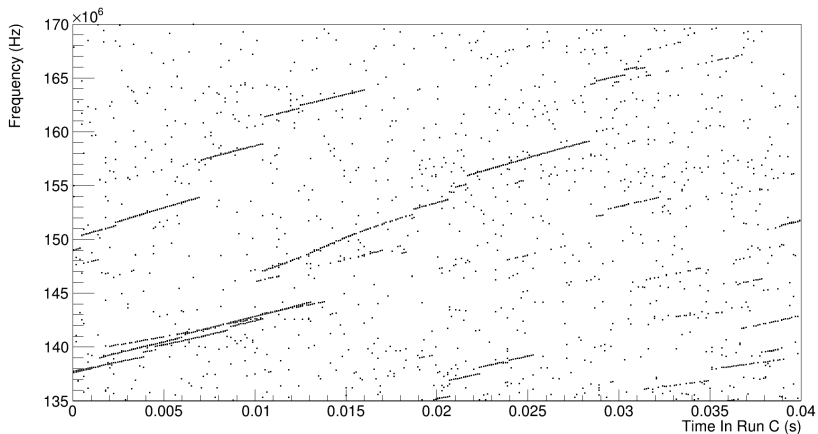
# Power Spectrogram

Spectrogram

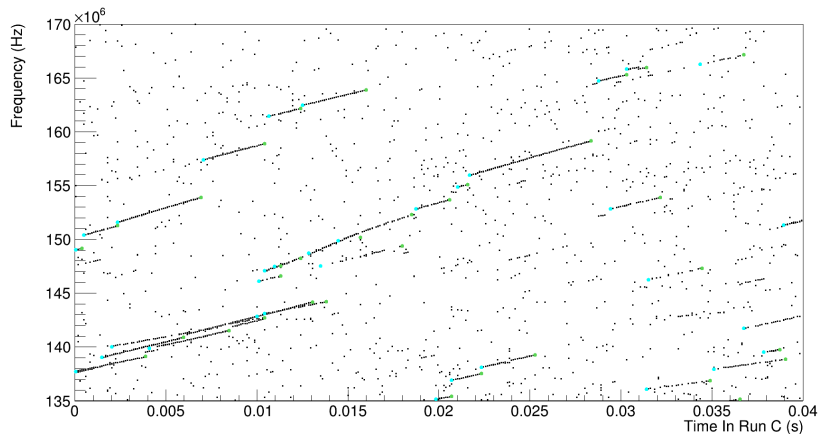




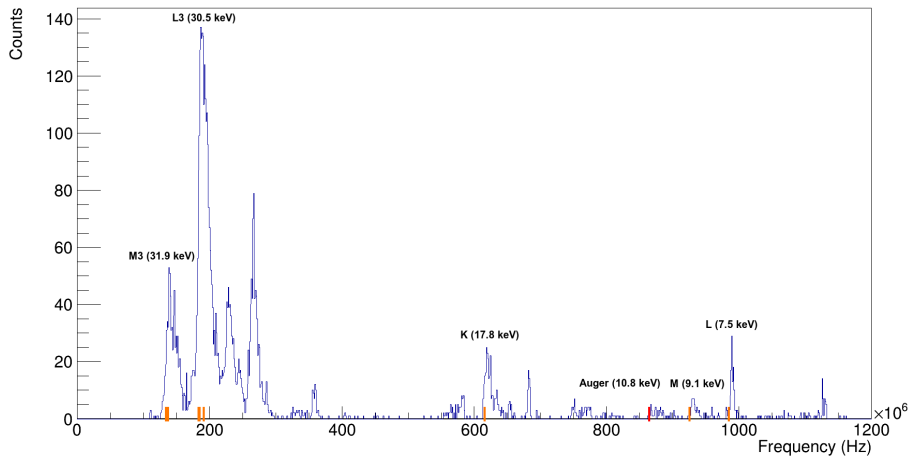
# Sparse Spectrogram



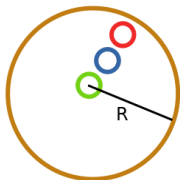
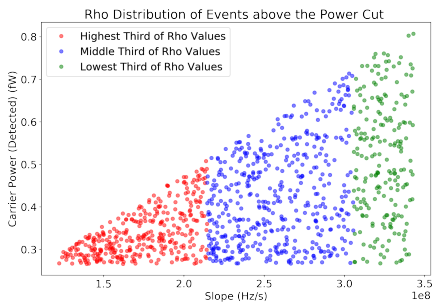
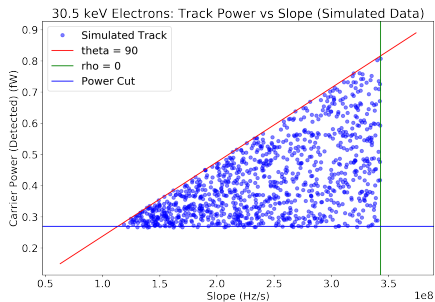
# Track Identification



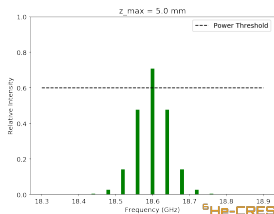
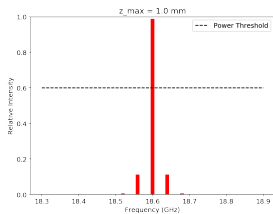
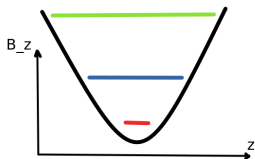
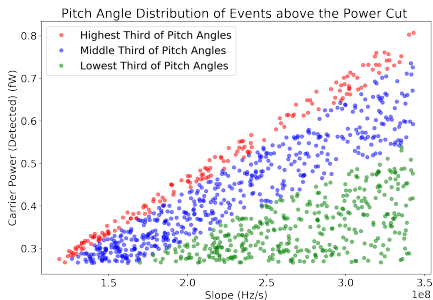
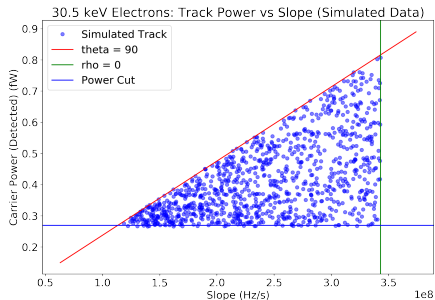
# Frequency Spectrum



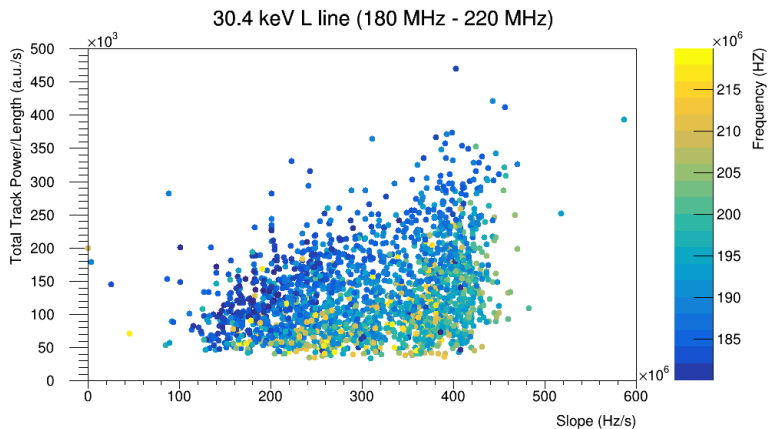
# Track Property Correlation (SIMULATION)



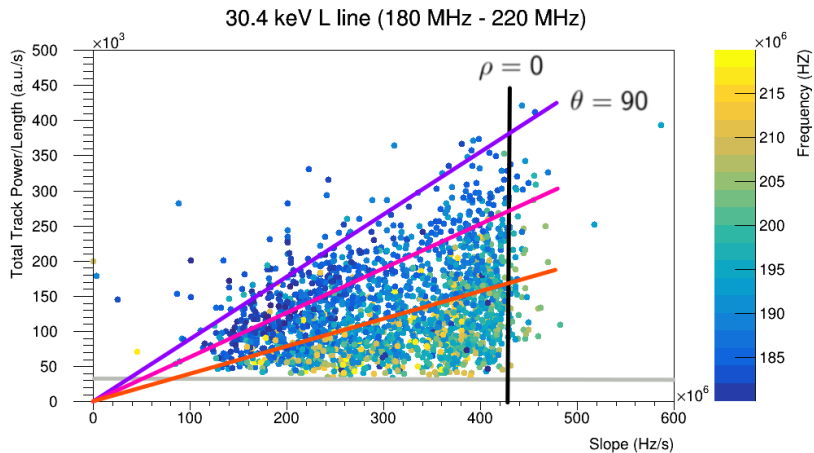
# Track Property Correlation (SIMULATION)



# Track Property Correlation (DATA)



# Track Property Correlation



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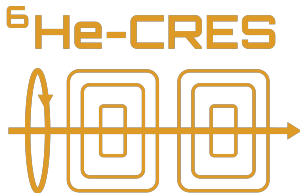
## Next Steps for the Experiment

- Take more  $^{83}\text{Kr}$  data with improved vacuum. (We are very optimistic!)
- Event reconstruction across scatters.
- Analyze sidebands.
- Implement product signal of two ends to eliminate sidebands.
- Ready to simultaneously measure the magnetic field during data taking as well as shim the background field.
- Both  $^6\text{He}$  and  $^{19}\text{Ne}$  sources are ready to go.
- Hope to have our first  $^6\text{He}$  beta spectrum this year!

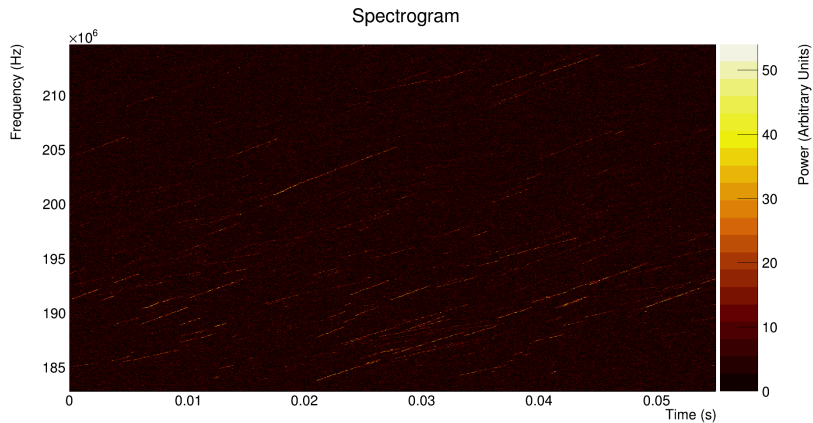


# Thanks to the $^6\text{He}$ -CRES Collaboration

W. A. Byron, W. DeGraw, B. Dodson, M. Fertl, A. García, B. Graner, E. Hanes, H. Harrington, L. Hayen, X. Huyan, S. Hightower, M. E. Higgins, N. C. Hoppis, M. Kimsey-Lin, K. Knutsen, D. McClain, D. Melconian, P. Mueller, N. S. Oblath, R. Roehnel, G. Savard, E. B. Smith, D. Stancil, D. W. Storm, H. E. Swanson, R. J. Taylor, J. Tedeschi, B. A. VanDevender, F. Wietfeldt, and A. R. Young,



# Questions?



# Frequency Spectrum

<b>B</b>	<b>0.6846 T</b>		
	E (eV)	$f_c$ (GHz)	$f_{meas}$ (MHz)
<b>L1 (9)</b>	7481	18.885	985.084
<b>M1 (9)</b>	9112.9	18.826	925.834
<b>N1 (9)</b>	9378.1	18.816	916.240
<b>K</b>	17824.2	18.516	615.732
<b>L1</b>	30226.8	18.091	191.452
<b>L2</b>	30419.5	18.085	185.0132
<b>L3</b>	30472.2	18.083	183.253
<b>M1</b>	31858.7	18.037	137.069
<b>M2</b>	31929.3	18.035	134.724
<b>M3</b>	31936.9	18.034	134.472

