

The Application of Coded Aperature Spectroscopy to Magnetic Sector Mass Spectrometers

X. E. Chen , Z. E. Russell, S. Wolter, J. J. Amsden, C. B. Parker, J.T. Glass, and D. J. Brady

Duke University, Electrical & Computer Engineering, Durham, NC 27708

Coded apertures have been widely used in multiplexed optical spectroscopy systems for higher signal to noise ratio and improved throughput without sacrificing resolution.[1,2]. For this work we apply the concept of using coded apertures to mass spectrometry for the first time. We designed a series of different coded aperture patterns including 2D Hadamard arrays and 1D Hadamard slit arrays. We have shown that the use coded apertures can improve ion throughput by 15x in comparison to a single slit without sacrificing mass resolution. One of the major obstacles in development of miniature sector mass spectrometers is the reduction in throughput when reducing the size. This research indicates that the addition of coded apertures can help alleviate this tradeoff.

Acknowledgments

This work was supported by the Department of Homeland Security, Science and Technology Directorate.

References

- [1] Brady, D.J. and A. Optical Society of, Optical imaging and spectroscopy, 2009, Hoboken, N.J.; [Washington, D.C.]: Wiley ; Optical Society of America.
- [2] Martin Harwit, Neil Sloane. Hadamard Transform Optics, 1979, Academic Press.