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**Joshua B Isralowitz\*** (jisralowitz@albany.edu). *Boundedness of paraproducts, commutators, and  $H^1$ -BMO duality in the two matrix weighted setting.*

In this talk we will discuss an extension of a very recent preprint by Irina Holmes, Michael Lacey, and Brett Wick to the fully matrix setting. More precisely, we will discuss the characterization of the two matrix weighted boundedness of commutators between matrix functions and any of the Riesz transforms in terms of a natural two matrix weighted BMO space (when both of the weights are matrix  $A_p$  weights.)

We will also discuss the characterization of the two matrix weighted boundedness of matrix symbolled dyadic paraproducts in terms of a dyadic version of this two matrix weighted BMO space and discuss the identification of our two matrix weighted BMO space as the dual of a natural two matrix weighted  $H^1$  space in the special case of both weights being matrix  $A_2$  weights. Finally, as a consequence of our results we will discuss a matrix Buckley summation condition for matrix  $A_2$  weights and a John-Nirenberg theorem for matrix  $A_2$  weighted BMO that generalizes the classical scalar result due to Muckenhoupt and Wheeden. (Received January 17, 2016)