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Role of Physics in Atmospheric Sciences: Laboratory Measurement of the Optical and Physicochemical Properties of Fresh and Aged Biomass Burning Aerosols and impacts on Climate and Health

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Students increasingly want their studies to serve a societal good, and show increasing enthusiasm about problems of global importance. Physics plays a role in solving societal problems such as mitigate the effects of climate change and combat air pollution etc. We report an interdisciplinary project that use laser spectroscopy t for atmospheric application. An indoor smog chamber facility is used for studying the optical properties of biomass burning (BB) aerosols using sub-Saharan Africa fuels. The chamber is coupled with a cavity ring-down spectrometer, nephelometer, CPC, DMA and other analytical instruments. BB aerosols are generated by combusting wood samples in a tube furnace that allows to control burn conditions (temperature, air flow, oxygen content, and amount of fuel burned) and differentiate burning stages. Results of the measurements of extinction, scattering and single scattering albedo, of fresh and photo chemically aged (in clean and VOC polluted environment) BB aerosols will be presented. Refractive indices are obtained by fitting experimental results with approach using the Raleigh-Debye-Ghan theory models and TEM images of filter samples. Results are compared with FIREX-AQ field campaign observations. .