

# Polarization on the Prairie: The History of Early Polarimetry and Ellipsometry in Nebraska, 1900-1920.

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For over 100 years Nebraska has a long tradition in polarized light! DeWitt Bristol Brace founded the UNL department of Physics in 1888 and the department of Electrical Engineering in 1895. Brace was an expert on polarized light and built a world-class research program at Nebraska. Clarence Skinner continued the polarized light research program started by Brace until 1919.

This presentation will highlight early work in polarimetry and ellipsometry at Nebraska by Brace, Skinner, and their students during the years 1900 to 1920. Particular emphasis will be placed upon the careers of Frederick John Bates and Arthur Quincy Tool. Both men used Brace's invention of the sensitive-strip spectropolariscope to improve the sensitivity of their polarimeter and ellipsometer instruments to the best in the world.

Bates used polarimetry for the investigation of liquid solutions. Subsequently, Arthur Tool constructed the first ellipsometer in Nebraska; a fully variable angle and spectroscopic research instrument. Tool used the ellipsometer at Nebraska to investigate the optical properties of metals.

Frederick Bates and Arthur Tool went on to long, productive careers at the National Bureau of Standards, a career path followed by many early UNL Physics graduates. Bates became America's foremost expert on polarimetry, developing improved polarimetry instrumentation and national standards for the sugar industry. Arthur Tool developed high-quality optical glass manufactured in the USA, using ellipsometry to characterize the quality of the glass. Today "Tool's equation" is known throughout the glass industry for proper heat treatment during production of optical glass.

The UNL Physics department has preserved much of the original equipment from this classic era. Polarimeters from the time of Frederick Bates will be displayed, and Arthur Tool's classic 1910 ellipsometer will be reassembled during this presentation.



***Physics & Astronomy***

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Lecture: 4:00 pm, 136 JH

Refreshments: 3:30 pm, 1st Floor Vending Area