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(54) **SYSTEMS FOR FLUORESCENCE ILLUMINATION USING SUPERIMPOSED POLARIZATION STATES**

(75) Inventor: **Jeremy R. Cooper**, Issaquah, WA (US)

(73) Assignee: **GE HEALTHCARE BIO-SCIENCES CORP.**, Piscataway, NJ (US)

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(52) **U.S. Cl.**

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USPC 359/368, 371, 385, 386, 387, 388, 389, 359/390, 433, 434, 435; 356/364, 365, 366, 356/367, 368, 369, 370; 250/225

See application file for complete search history.

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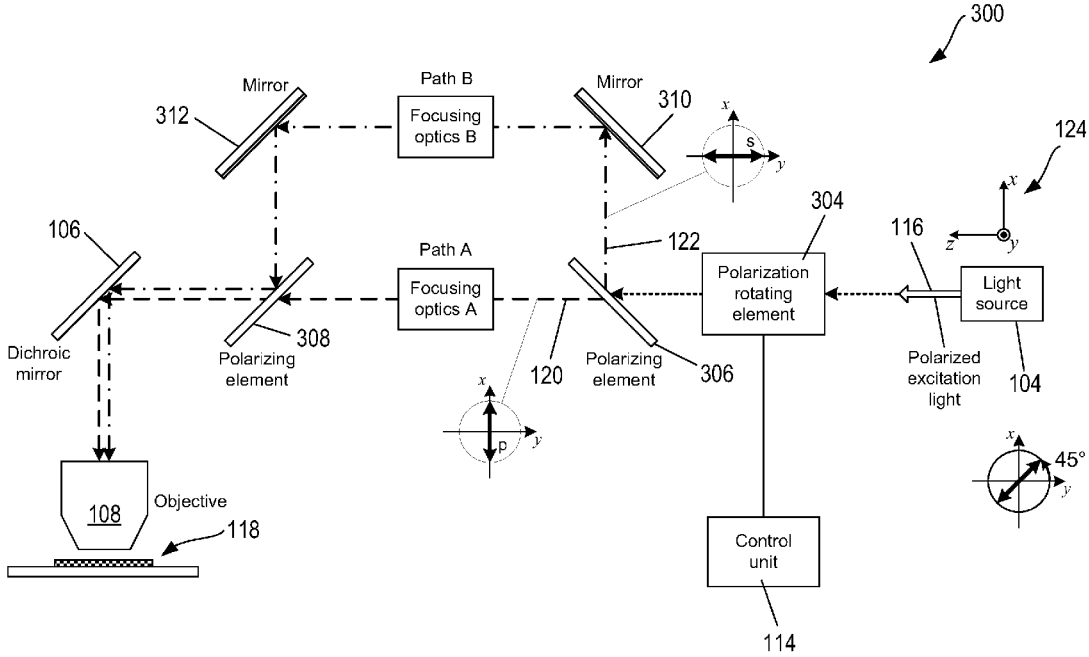
Primary Examiner — Thomas K Pham
Assistant Examiner — Cara Rakowski
(74) *Attorney, Agent, or Firm* — Sutherland Asbill & Brennan LLP

(57) **ABSTRACT**

Various superimposing beam controls that can superimpose beams of light with different optical properties are described. In one aspect, a beam control receives a beam of light and outputs one or more beams. Each beam is output in a different polarization state and with different optical properties. Superimposing beam controls can be incorporated in fluorescence microscopy instruments to split a beam of excitation light into one or more beams of excitation light. Each beam of excitation light has a different polarization and is output with different optical properties so that each excitation beam can be used to execute a different microscopy technique.

20 Claims, 11 Drawing Sheets