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### **Title**

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**Polarization pyrometry: initial proof-of principle experiments  
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## **Polarization pyrometry: initial proof-of principle experiments.**

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### Abstract

The conventional pyrometer is based on measuring thermal emission normal to a surface. If the surface emissivity is unknown the final instrument uncertainty can be as high as 20%. A novel approach to determine surface temperature with a greater precision is based on exploiting the polarization properties of emission from a plane surface. In this concept “classical” pyrometry is supplemented with measurements of p and s polarized self-emission at several angles. In the “Fresnel surface” approximation, such emission at a given wavelength is described by two optical coefficients, i.e. refraction,  $n$  and extinction,  $k$  coefficients. If measurements are performed at two or more angles,  $n$ ,  $k$  (and eventually emissivity) can be determined uniquely thus allowing for the true temperature determination. This talk will report on initial proof-of-principle experiments, where a functioning prototype was applied to tungsten foils ohmically-heated with DC currents up to 2500 K. The temperatures obtained were compared to single channel and multi-wavelength pyrometers and reasonable agreement was found. A more rigorous validation with a thermocouple is discussed.