

END-TO-END CREATION OF A  
**CONICAL REFRACTION  
POLARIMETER**

BUILDING A STATE OF THE ART  
AFFORDABLE DEVICE  
TO MONITOR LINEAR POLARIZATION

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# End-to-End Creation of a Conical Refraction Polarimeter

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# Introduction

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**Abstract**

**Objectives**

**Guideline**

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# Part A: Conical Refraction Essentials

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In this first section, we will review the basic theoretical explanation of the Conical Refraction (CR) phenomenon in which the developed device will be based.

## A.1. The Revival of Conical Refraction

Sartun Hamiltonegaz etc, esan zer dan en sí, ta zer implikeu ban beren egunien, zelan gero aztute geratu zan hasta tal eta formulaziño modernoak tal. Ipiñi dibujo klasiko bat del fenómeno, el cono ese, nik einde eskuz.

## A.2. Berry's Mathematical Description of the Phenomenon

En más o menos detalle guredozulez azaldu fenomenoan matematikie eta batezbe heldu formula finalatara

## A.3. Simulating the Phenomenon

Azaldu GPU/CPU tradeoffa, zelan implemente doten eta jarri imagenak. Azaldu zelan si lienar pol tal, si cricular pol tal imagenakaz. Sugeridu zer alko genun ein orduen linear polrztion aldaketak antzemateko.

## A.4. A Natural Polarimeter

Esan zelan alko zendun argixen polarizaziño tal danak deskribatu einde bi besogaz et al, baia zelan simplifike al dan ze kiralidade temak LPgaz nahiko eta hori da polarimetroan merkatu handixetako bat.

## Appendix $\alpha$ : Jones and Stokes Representations of Polarization

Ba hori

## Part B: Designing the Hardware

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### B.1. Experimental Implementations of the Polarimeter

Azaldu bakjotza dibujo bategaz eta identifikatu problemak, edo gubazun hori hobeto argazki batzuk ipiñitze hurrengo sekunzioan, esaten posiblez azaldu a las ke se deba, al dozu citeu ah artikuloa ta beran imajena bebai.

### B.2. Main Non-Idealities in the Experimental Rings

### B.3. Final Proofs of Concept

Bat ya einda egoin zana, en el ke implementé la GUI akella, argazki bat, con fotos de la GUI etc.

Bestie, lortzen badogun eitzie hutsiñegaz y tal, planoak ein eskuz ni ke sea

COST ANALYSIS EGIN

### Appendix $\beta$ : Employed Optical Elements



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## Part C: Designing the Software

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## **C.1. Artificial Noise Generation**

## **C.2. Simulated Image Datasets**

## **C.3. Embedding Space Algorithms**

### **C.3.1. Data Manifold Dimension Identification**

### **C.3.2. Metric Learning**

### **C.3.3. Nearest Neighbors**

## **C.3. Geometric Algorithms**

Tos los geometricos y los optimizadores implementados.

## **C.4. Simulation Fitting Algorithms**

## **C.5. The Best Algorithm and Pre-processing**

## **Appendix $\gamma$ : The Implemented Optimizers**

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## Part D: The Final Device

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**D.1. Performance on Experimental Data**

**D.2. Commercial Polarimeters**

**D.3. Potential Niches**

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## Conclusions

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## References

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