

**ANALYSIS OF CONVERSION OF SOLAR ENERGY IN NARROW
WAVELENGTH REGIMES AS AN ENABLING TECHNOLOGY**

A Dissertation
Presented to
The Academic Faculty

By

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WAVELENGTH REGIMES AS AN ENABLING TECHNOLOGY**

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I'm not super. Any talents I have, I worked for – it seems a long time since I thought of myself as a hero.

Oliver Queen

For my cousin Kara

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LIST OF ACRONYMS

STAR Labs Scientific and Technological Advanced Research Laboratories

UV ultraviolet

SUMMARY

There has been much speculation on whether or not efficient conversion of solar light to energy will have a breakthrough which enables high efficiency, low cost, and enabling of other capabilities previously not thought possible, whether through cellular means, semiconductor based, or otherwise. This work aims to answer some of the questions surrounding these matters.

CHAPTER 1

INTRODUCTION AND BACKGROUND

1.1 Stars

It is common knowledge that the star closest to Earth is the Sun, and also that the Sun is yellow. It is this yellow sunlight which is interesting for some of its properties [1]. For instance, plants, algae, and cyanobacteria convert this light into energy via photosynthesis. In Figure 1.1 is a photo of a galaxy which contains many stars.



Figure 1.1: Barred spiral galaxy NGC 1300 photographed by Hubble telescope. While the galaxy in the photo is not our sun, it does emit light, much like our sun. Image credit: NASA.

The stars in the sky are of particular interest to the aptly named Scientific and Technological Advanced Research Laboratories (STAR Labs), which in many recent experiments has shown promising results in converting this energy in a non-photoelectric sense into usable energy [2]. Interestingly, STAR Labs has theorized that the famous superhero known as “Superman” converts the light from our sun, which grants his fantastic abilities. There

are many methods in industry for converting the sun's energy (of about 1000 W/m^2) into electrical energy. Some of these are highlighted in Table 1.1.

Table 1.1: Renewable energy installations around the world – the energy generated at these sites is ultimately derived from the sun

installation	type	capacity (GW)	location
Longyangxia Dam	photovoltaic	0.85	China
Gansu Wind Farm	wind	6	China
Sihwa Lake	tidal	0.254	South Korea

CHAPTER 2

METHODOLOGY

The process of data collection began with analysis of the physical principles underlying optical light emission. For illustration purposes, see Figure 2.1.

2.1 The Various Types of Light

Depending on the energy of a photon, it may be referred to as “light” (in the case of optical photons) or as something else – for example, a gamma ray. By convention, there are many names for these particles.

2.1.1 Low-energy photons

The lowest energy electromagnetic radiation is carried by radio waves.

2.1.2 Intermediate-energy photons

These include several types of radiation, including the usually-harmful ultraviolet (UV).

Microwaves

Microwaves have wavelengths on the order of 1×10^{-2} m, or a few cm.

Visible light

Visible light is that which is detectable by the human eye, with wavelengths about 380 nm to 750 nm.

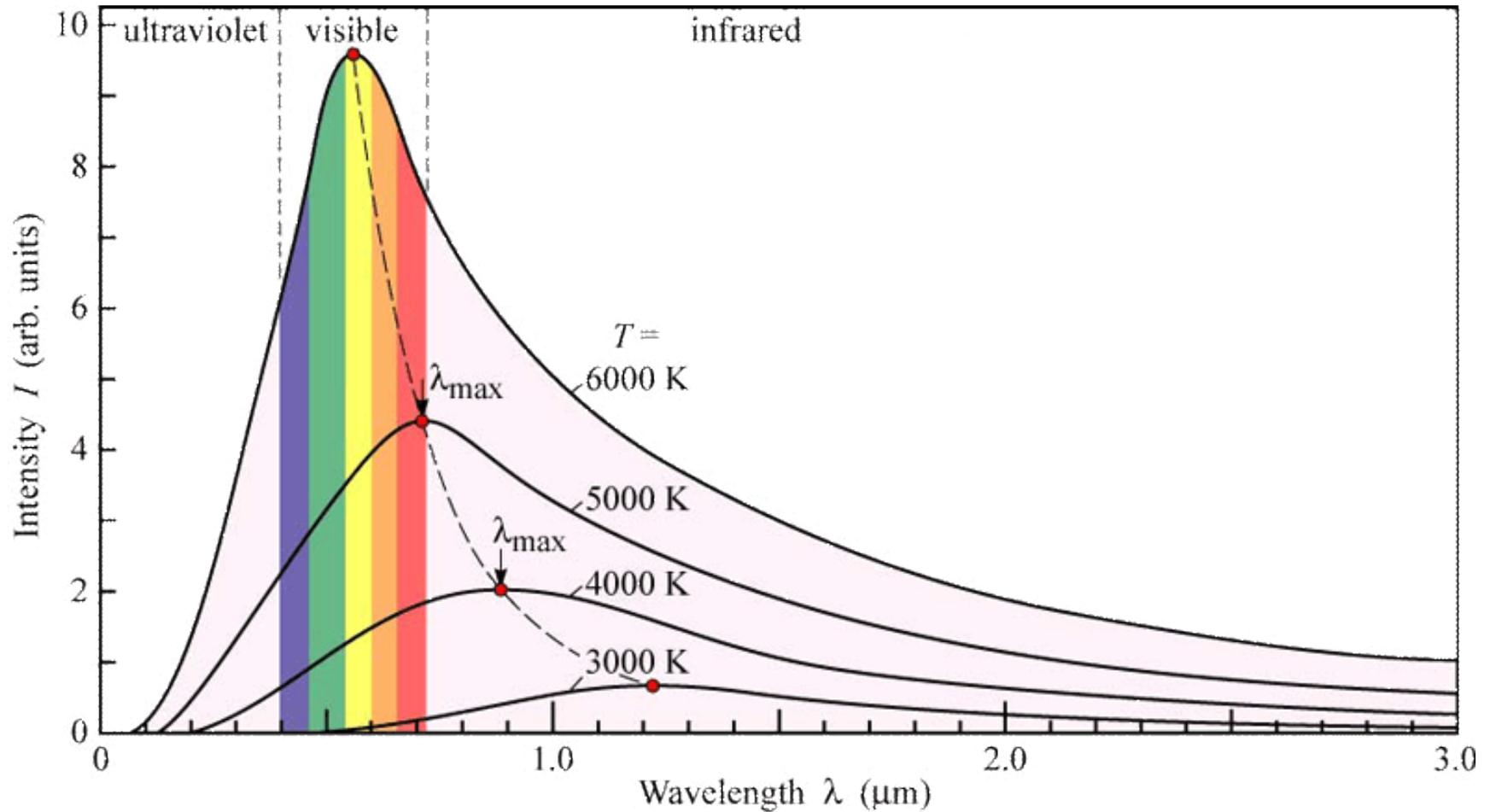


Figure 2.1: Spectra of black-body radiation at various temperatures, according to Wien's displacement law [3].

Appendices

APPENDIX A
EXPERIMENTAL EQUIPMENT

A telescope and a spectrometer were used to analyze the sun. Many other instruments were used.

APPENDIX B
DATA PROCESSING

Data was processed before being added to this document.

REFERENCES

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VITA

Clark Kent was born on April 18, 1938, and adopted by parents Jonathan and Martha Kent in Kansas. He currently resides in the city of Metropolis, where his reporting for the Daily Planet has earned him critical acclaim both at home and abroad. He frequently collaborates with such fellow journalists as his Pulitzer-winning wife Lois Lane, close friend James “Jimmy” Olsen, and longtime editor Perry White.

Clark and Lois enjoy their quiet time together, when they can play with their dog and their teenage son, Jonathan.