

Bibliographical Project

X-Rays and Radiography
(based on the work of Wilhem Röntgen)



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Introduction

In the introduction, we will introduce you to the historical context of X-ray discovery and the significance of Wilhelm Conrad Röntgen's work.

[Basics of X-ray Physics - X-ray production](#)

[Wilhelm Conrad Roentgen | Biography, Discovery, X-Rays, & Facts | Britannica](#)

Chapter 1

Historical Background

1.1 Radiation Understanding in the Late 19th century

Here we'll talk about the scientific and technological developments preceding Röntgen's work. We will also talk about the state of physics and understanding of radiation in the late 19th century.

Chapter 2

Life and Career of Wilhelm Conrad Röntgen

2.1 Early Life of an enthusiastic genius

Sometimes history is made of incredible destiny. Wilhelm Conrad Röntgen, born on March 27th, 1845 near Dusseldorf, Germany was not incline to brilliant physics studies. His father a sheet merchant did not push him throughout this way. Röntgen's early life was marked by a move to Netherlands for his father's business.

2.2 Röntgen's groundbreaking experiment

First, we will do a quick biography of Wilhelm Conrad Röntgen's early life and education, his career progression and key influences. Then we will talk over how his background contributed to his groundbreaking work.¹

[Wilhelm Conrad Röntgen: The scientist and his discovery - ScienceDirect](#)

¹Fridtjof Nüsslin. "Wilhelm Conrad Röntgen: The scientist and his discovery". In: *Physica Medica* 79 (2020). 125 Years of X-Rays, pp. 65–68. ISSN: 1120-1797. DOI: <https://doi.org/10.1016/j.ejmp.2020.10.010>. URL: <https://www.sciencedirect.com/science/article/pii/S1120179720302532>.

Chapter 3

The Discovery of X-Rays

3.1 Impact of Röntgen's X-Rays discovery

In this chapter we will reveal Röntgen's experimental setup and methodology, the moment of his discovery. Then we will show the first X-ray images, and the reaction of the public and scientific world after the discovery.

3.2 Radiography's Early Applications and Pioneers

Here, we will dive thought on how Röntgen's discovery led to the development of radiography. We will also discuss about the pioneers in radiography who followed Röntgen. We will finalize by talking about the early applications of radiography in medicine and industry.

Chapter 4

Advances in Radiographic Technology

4.1 Evolution of Radiography Equipment and Techniques

Here, we will talk about the evolution of radiographic equipment and techniques.

4.2 Technological Breakthroughs in Radiography

We will follow up by discussing technological breakthroughs in radiography.

4.3 Radiography During World War I and II

We will extend this chapter by talking about the impact of World War I and World War II on radiography.

[Principles of radiography | Radiology Key, \(radiographie\)](#)

[History of Radiology: Timeline, Pioneers, Inventions | RamSoft](#)

Chapter 5

Modern Applications of Radiography

5.1 Contemporary Uses and Challenges in Radiography

We will emphasize here the contemporary uses of radiography in medicine, industry, and other fields, along with the benefits and challenges of modern radiographic technology. [Radiology in 2020: Opportunities and Challenges - HealthManagement.org](#)

Chapter 6

Ethical and Safety Considerations in Radiography

6.1 Ethical and Safety issues in Radiography

We will talk about ethical and safety issues related to radiographic procedures
[History of Radiation Regulation in Medicine - Radiation In Medicine - NCBI Bookshelf \(nih.gov\)](#)
[5 Imperatives for Radiation Dose Management in Medical Imaging \(hbr.org\)](#)

6.2 Development of Safety Protocols and Regulations

In this chapter we will discuss the development of safety protocols and regulations, along with the importance of radiation dose management.

[Radiation - Artificial Sources | Britannica](#) (affects of radiation on body with charts)

Chapter 7

Wilhem Conrad Röntgen's Legacy

7.1 Importance of Radiation Dose Management

7.2 Lasting Impact and Legacy Röntgen

7.3 Recognition and Honors for Röntgen

In this chapter we will talk about the lasting impact of Röntgen's work on X-rays and radiography. Then we will see the recognition and honours he received, and how his legacy continues to influence the field.

Chapter 8

Future Trends in Radiography

8.1 Future advancements in Radiography

8.2 Emerging Technologies and AI in Radiography

Here we will discuss and argue about the potential advancements and innovations in radiography. The emerging technologies and applications in the field, and the role and influence that of artificial intelligence could have in radiography. [Artificial intelligence in radiography: Where are we now and what does the future hold? - ScienceDirect](#)

Chapter 9

Conclusion

- Summarize the key findings and contributions discussed in the essay. - Reflect on the enduring significance of Wilhelm Conrad Röntgen's work. - Discuss the ongoing and future relevance of radiography in various fields.

Bibliography

- List all the sources used in your research and writing, following a specific citation style (e.g., APA, MLA).

A real references numerotation system will be implemented, the use of \LaTeX is really powerful for that. At the moment we only have link included in each section. We are aware of the necessity to have exhaustive and clear references for our work.

Books

- [2] Röntgen Wilhelm Conrad et al. *Röntgen : choix de textes, bibliographie, portraits, fac-similés / présentation par Jacques Nicolle*. fre. Savants du monde entier. Paris: Seghers.
- [7] Nicolle Jacques and Jacques Nicolle. *W. C. Röntgen (1845-1923) et l'ère des rayons X : conférence donnée au Palais de la Découverte... le 21 janvier 1967 / Jacques Nicolle,...* fre. «[Les »Conférences du Palais de la Découverte] Histoire des sciences. Paris: Palais de la Découverte, cop. 1967.
- [9] D. Gottfried Kate-Louise and Gary Penn. *Radiation in Medicine: A Need for Regulatory Reform*. Ed. by Committee for Review and Institute of Medicine Evaluation of the Medical Use Program of the Nuclear Regulatory Commission. Washington, D.C.: National Academies Press, 1996. Chap. G - History of Radiation Regulation in Medicine, pp. 249–257. ISBN: 0-309-58875-8. URL: <https://www.ncbi.nlm.nih.gov/books/NBK232703/>.
- [15] *Wilhelm Röntgen*. Encyclopædia Britannica, inc. URL: <https://www.britannica.com/biography/Wilhelm-Rontgen>.

Articles

- [3] “Ethical Issues in Diagnostic Radiology”. In: *American Medical Association Journal of Ethics* 9.11 (Nov. 2007), pp. 735–783.
- [4] Maurice Goldman. “La découverte des électrons”. In: *Académie des Sciences Histoire des sciences / Évolution des disciplines et histoire des découvertes* (May 2013). URL: https://www.academie-sciences.fr/archivage_site/activite/hds/textes/evol_Goldman1.pdf.

- [5] Prof. Moshe Graif. “Radiology in 2020: Opportunities and Challenges”. In: *Journal Of Health Management* 14 (2014): 3, *Management Matrix*. URL: <https://healthmanagement.org/c/healthmanagement/issuearticle/radiology-in-2020-opportunities-and-challenges#:~:text=%E2%80%A2%20Radiological%20technology%20is%20shifting%20from%20a%20%E2%80%9Cdisruptive%E2%80%9D,In%20vitro%20diagnostics%20will%20change%20radiological%20screening%20policy>.
- [8] Dr. ès sciences physiques Jean-Jacques Samueli. “La découverte des rayons X par Röntgen”. In: *BibNum* (2009). DOI: <https://doi.org/10.4000/bibnum.714>. URL: <http://www.bibnum.education.fr/sites/default/files/RONTGEN-ANALYSE.pdf>.
- [10] C. Malamateniou et al. “Artificial intelligence in radiography: Where are we now and what does the future hold?” In: *Radiography* 27 (2021). The Future Role of the Radiographer, S58–S62. ISSN: 1078-8174. DOI: <https://doi.org/10.1016/j.radi.2021.07.015>. URL: <https://www.sciencedirect.com/science/article/pii/S107881742100095X>.
- [11] Fridtjof Nüsslin. “Wilhelm Conrad Röntgen: The scientist and his discovery”. In: *Physica Medica* 79 (2020). 125 Years of X-Rays, pp. 65–68. ISSN: 1120-1797. DOI: <https://doi.org/10.1016/j.ejmp.2020.10.010>. URL: <https://www.sciencedirect.com/science/article/pii/S1120179720302532>.

Online Resources

- [1] *Artificial Source*. URL: <https://www.britannica.com/science/radiation/Effects-of-visible-and-ultraviolet-light>.
- [6] *History Of Radio*. URL: <https://www.ramsoft.com/history-of-radiology>.
- [12] *Physica Medica*. URL: <https://www.sciencedirect.com/journal/physica-medica/vol/79/suppl/C>.
- [14] *Principles of radiography*. URL: <https://radiologykey.com/principles-of-radiography/>.

Other Documents

- [13] Henri Poincaré. *Letter from H. Poincaré to W. C. Röntgen*. Congratulation for his discovery and questions on his work. Archives Henri Poincaré, July 1896. URL: <https://henripoincare.fr/s/correspondance/item/8007> (visited on 11/24/2023).

appendix

- Include supplementary materials, such as additional images, charts, or data.
- Include the reproduction of the letter of Poincaré in the appendix. We may quote it some

part as a witness and illustrate the report with this piece of history.¹

- Jacques Nicolle is a brilliant physicist that have produce very interesting researches on the work of several Physicists. His work his very usefull for us.

General Remarks

Ensure thorough research and critical analysis throughout the essay. Maintain proper citation and adhere to the chosen citation style guidelines. Ensure a logical flow and coherence in the essay as you transition between chapters and sections.

¹Henri Poincaré. *Letter from H. Poincaré to W. C. Röntgen*. Congratulation for his discovery and questions on his work. Archives Henri Poincaré, July 1896. URL: <https://henripoincare.fr/s/correspondance/item/8007> (visited on 11/24/2023).