Astronomy, Space Science and Astrophysics

Investigating diodes & rectification of an AC signal

Stage 1 - PH370 Physics Labs

Monday 15th/22nd January 2017

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Lab Partner: Benedict John Wye

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1 Introduction

Diodes are electronic components which allow current to only flow in one direction. Within this experiment, i will explore the properties of various diodes (As can be seen in fig. 1).

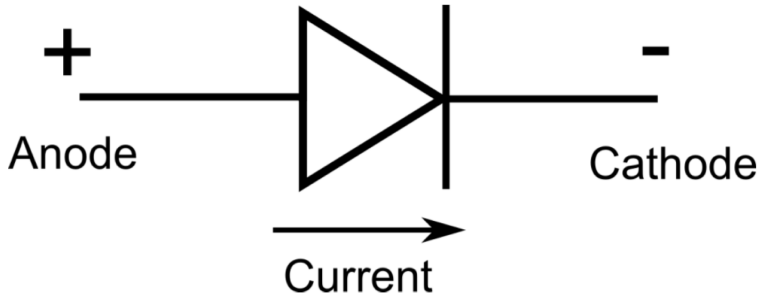

Figure 1: Circuit symbol for a regular diode.

The

2 Method & Equipment

2.1 Apparatus

- Oscilloscope
- Signal generator
- Electronic components
  - 470 Ω Resistor
  - 1 kΩ Resistor
  - 10 kΩ Resistor
  - 1 μF Capacitor
  - 10 μF Capacitor
- 3 x BNC Lead
- Leybold Plug-in board
- 2 x Banana plugs to BNC socket
- Diodes
  - 1N4007 Diode
  - Red & Blue LED's
  - 3.3V Zener Diode

2.2 Data Collected

- f

2.3 Risk Assessment

efwfwef

3 Experimental Procedure

3.1 Relationship between voltage and current for a diode

s

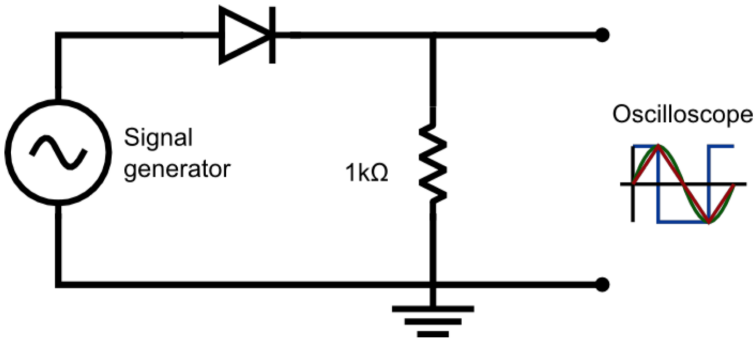

Figure 2: Circuit for half-wave rectification.

3.2 Half-wave rectification of an AC signal

3.3 Investigating the Characteristics of LEDs

3.4 LEDs in parallel

3.5 Dim LEDs: An Introduction to Pulse Width Modulation (PWM)

3.6 Using a Zener diode as voltage regulator

4 Results & Disscussion

4.1 Main Results

Input Voltage 200mv	300mv	400mv	500mv	600mv	700mv	800mv	900mv
Output Voltage	6	4	0	2	10	5	12

4.2 Analysis

5 Conclusion

```
\documentclass[12pt]{article}
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\usepackage{amsmath}
\usepackage{graphicx}
\usepackage{float}
\usepackage{dsfont}
\usepackage{amsfonts}
\usepackage[T1]{fontenc}
\usepackage[colorinlistoftodos]{todonotes}
\usepackage[margin=2.5cm,a4paper]{geometry}
\usepackage{listings}
\usepackage{minted}
\usepackage{multicol}
\usepackage{fancyhdr}
\usepackage{cite}
\usepackage{cleveref}
\usepackage{siunitx}
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    morekeywords={}
    }

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\rhead{PH370 Physics Labs}
\lhead{Investigating diodes \& rectification of an AC signal}
\rfoot{-\thepage\centering-}
```

```
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\begin{titlepage}

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\newcommand{\HRule}{\rule{\linewidth}{0.5mm}}

\begin{centering}

%----------------------------------------------------------------------------
%        HEADING SECTIONS
%----------------------------------------------------------------------------

\includegraphics[scale=0.4]{Uni_of_Kent_Logo.png}\\[1cm]

%----------------------------------------------------------------------------
%        TITLE SECTION
%----------------------------------------------------------------------------

\HRule \\[0.4cm]
\textsc{\large Astronomy, Space Science and Astrophysics}\\[0.4cm]
{\huge \bfseries Investigating diodes \& \\ [0.4cm] rectification of an
↪  AC signal}\\[0.4cm]
\HRule \\[1.0cm]

%----------------------------------------------------------------------------
%        DATE SECTION
%----------------------------------------------------------------------------

\textsc{\Large Stage 1 - PH370 Physics Labs}\\[0.5cm]
{\large Monday 15th/22nd January 2017}\\[1.0cm]

%----------------------------------------------------------------------------
%        AUTHOR SECTION
%----------------------------------------------------------------------------

\begin{minipage}{0.625\textwidth}
\centering

\emph{\large Report Author:} \large Lukasz R Tomaszewski \\ [0.2cm]
\emph{\large Lab Partner:} \large Benedict John Wye \\

\end{minipage}\\[2cm]

\vfill
\end{centering}
\end{titlepage}

%----------------------------------------------------------------------------
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%---------------------------------------------------------------------------
%        CONTENTS
%---------------------------------------------------------------------------
%---------------------------------------------------------------------------

\newpage
\begin{titlepage}
\begin{tableofcontents}

\end{tableofcontents}
\end{titlepage}

%---------------------------------------------------------------------------
%---------------------------------------------------------------------------
%        INTRODUCTION
%---------------------------------------------------------------------------
%---------------------------------------------------------------------------

\section{Introduction}

Diodes are electronic components which allow current to only flow in one
 ↪  direction. Within this experiment, i will explore the properties of
 ↪  various diodes (As can be seen in \cref{SymbolRegDiode}).

\begin{figure}[h]
\centering
\includegraphics[scale=0.4]{Circuit_symbol_for_a_regular_diode.png}
\caption{Circuit symbol for a regular diode.}
\label{SymbolRegDiode}
\end{figure}

The

%---------------------------------------------------------------------------
%---------------------------------------------------------------------------
%        METHOD & EQUIPMENT
%---------------------------------------------------------------------------
%---------------------------------------------------------------------------

\section{Method \& Equipment}

%---------------------------------------------------------------------------
%        APPARTUS
%---------------------------------------------------------------------------

\subsection{Apparatus}

\begin{multicols}{2}
```

```
\begin{itemize}
        \item Oscilloscope
    \item Signal generator
    \item Electronic components \begin{itemize}
    \item 470 {\si{\ohm}} Resistor
    \item 1 k{\si{\ohm}} Resistor
    \item 10 k{\si{\ohm}} Resistor
    \item 1 {\si{\mu}}F Capacitor
    \item 10 {\si{\mu}}F Capacitor
    \end{itemize}
    \item 3 x BNC Lead
    \item Leybold Plug-in board
    \item 2 x Banana plugs to BNC socket
    \item Diodes \begin{itemize}
    \item 1N4007 Diode
    \item Red \& Blue LED's
    \item 3.3V Zener Diode
    \end{itemize}
\end{itemize}
\end{multicols}

%-------------------------------------------------------------------------
%        DATA COLLECTED
%-------------------------------------------------------------------------

\subsection{Data Collected}

\begin{multicols}{2}
\begin{itemize}
        \item f
\end{itemize}
\end{multicols}

%-------------------------------------------------------------------------
%        RISK ASSESSMENT
%-------------------------------------------------------------------------

\subsection{Risk Assessment}

efwfwef

%-------------------------------------------------------------------------
%-------------------------------------------------------------------------
%        EXPERIMENTAL PROCEDURE
%-------------------------------------------------------------------------
%-------------------------------------------------------------------------

\section{Experimental Procedure}
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%---------------------------------------------------------------------
%        RELATIONSHIP BETWEEN VOLTAGE AND CURRENT FOR A DIODE
%---------------------------------------------------------------------

\subsection{Relationship between voltage and current for a diode}

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\begin{figure}[h]
\centering
\includegraphics[scale=0.35]{Half_Wave_Retification.png}
\caption{Circuit for half-wave rectification.}
\label{SymbolHalfWaveRet}
\end{figure}

%---------------------------------------------------------------------
%        HALF-WAVE RETIFICATION OF AN AC SIGNAL
%---------------------------------------------------------------------

\subsection{Half-wave rectification of an AC signal}

%---------------------------------------------------------------------
%        INVESTIGATING THE CHARACTERISTICS OF LEDS
%---------------------------------------------------------------------

\subsection{Investigating the Characteristics of LEDs}

%---------------------------------------------------------------------
%        LEDS IN PARALLEL
%---------------------------------------------------------------------

\subsection{LEDs in parallel}

%---------------------------------------------------------------------
%        DIM LEDS: AN INTRODUCTION TO PULSE WIDTH MODULATION (PWM)
%---------------------------------------------------------------------

\subsection{Dim LEDs: An Introduction to Pulse Width Modulation (PWM)}

%---------------------------------------------------------------------
%        USING A ZENER DIODE AS VOLTAGE REGULATOR
%---------------------------------------------------------------------

\subsection{Using a Zener diode as voltage regulator}

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%---------------------------------------------------------------------
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%        RESULT & DISSCUSSION
%-------------------------------------------------------------------------
%-------------------------------------------------------------------------

\section{Results \& Disscussion}

%-------------------------------------------------------------------------
%        MAIN RESULTS
%-------------------------------------------------------------------------

\subsection{Main Results}

\begin{tabular}{l*{6}{c}r}
Input Voltage    200mv & 300mv & 400mv & 500mv & 600mv & 700mv & 800mv &
↪  900mv \\
\hline
Output Voltage   & 6 & 4 & 0 & 2 & 10 & 5 & 12  \\
\\

\end{tabular}

%-------------------------------------------------------------------------
%        ANALYSIS
%-------------------------------------------------------------------------

\subsection{Analysis}

%-------------------------------------------------------------------------
%-------------------------------------------------------------------------
%        CONCLUSION
%-------------------------------------------------------------------------
%-------------------------------------------------------------------------

\section{Conclusion}

%-------------------------------------------------------------------------
%        REFERENCES
%-------------------------------------------------------------------------

\bibliographystyle{plain}

%-------------------------------------------------------------------------

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\end{document}
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