IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

NUCLEAR DIPLOMACY DURING WORLD WAR II

SUBMITTED BY – ABHIJITH.M

ENROLLMENT NO – A6247320041

PROGRAM - BA (Hons) History

INTRODUCTION

The Nuclear Tactfulness means that the commerce and accommodations which had been done between the Countries in order to look after the nuclear munitions possession as well as to look after in using of nuclear munitions against Eachother. Nuclear munitions were considered to be a significant source of public security and an important interference against implicit raiders, making nuclear tactfulness a pivotal aspect of transnational relations since the arrival of nuclear munitions in the 1940s. The Main Aim of Nuclear Tactfulness is to help the spread of nuclear munitions, reduce the threat of nuclear war between the nations, and ensure that nuclear munitions aren't used as a means of aggression or to use as a means of hanging . The use of nuclear munitions in warfare was first demonstrated by the United States during World War II, with the bombings of Hiroshima and Nagasaki in Japan. The Desolation caused by these bombings led to a global recognition of the destructive power of nuclear munitions and the need for Transnational cooperation to control their use and proliferation. Following the end of World War II, the United States and the Soviet Union Surfaced to be the two dominant superpowers, each enjoying nuclear munitions. The Trouble of Nuclear war between these two powers during the Cold War led to a significant focus on nuclear tactfulness, with both countries engaging in arms control accommodations and covenants to limit the spread of nuclear munitions and reduce the threat of nuclear war. One of the most significant achievements in Nuclear tactfulness was the NuclearNon-Proliferation Treaty(NPT), which was inked in 1968 and has been ratified by utmost countries in the world. The Treaty(NPT) aims to help the spread of nuclear munitions and promote demilitarization. Under the NPT,non-nuclear-weapon countries agree not to develop or acquire nuclear munitions, while nuclear- armament countries agree to work towards demilitarization and not to transfer nuclear munitions to other countries. Despite the success of the NPT, nuclear tactfulness has faced significant problems. Some Countries have failed to agree with their convention scores, while others have sought to develop nuclear munitions in against of the convention. The emergence of new Nuclear-Fortified Countries, similar as North Korea, has also presented significant challenges to nuclear tactfulness. One of the crucial challenges to Nuclear Tactfulness is the development of new nuclear munitions technologies. In recent times, there has been a significant focus on the development of lower, more precise nuclear munitions, which are frequently appertained to as" low-yield" or" politic" nuclear munitions. These munitions are designed to be used in limited conflicts and are seen by some as a further usable option than traditional nuclear munitions. The development of these munitions has raised Enterprises about the eventuality for their use and the threat of nuclear escalation in the event of a conflict.

Another significant challenge to nuclear tactfulness is the emergence of cyber pitfalls to nuclear munitions systems. As nuclear munitions systems come decreasingly reliant on computer systems and networks, they come vulnerable to Cyber attacks. A successful Cyber attack on a nuclear munitions system could have

disastrous consequences, leading to accidental launch of the infinitesimal lemon to the countries or worse the concession of sensitive information to terrorists groups or countries. The development of effective cyber security measures for nuclear munitions systems has come a crucial focus of Nuclear Diplomacy. The success or failure of nuclear tactfulness has significant counteraccusations for global peace and security. The continued possession and implicit use of nuclear munitions presents a Significant threat of disastrous consequences, making the forestallment of nuclear war and the control of nuclear munitions as to be a pivotal aspect of transnational relations. Effective nuclear Tactfulness requires cooperation and trust between countries, as well as a commitment to demilitarization and non-proliferation to avoid a full scale nuclear war between the countries.

The emergence of the nuclear weapons in the world war II was considered to be turning point in the history of all the global nations and after the use of atomic bomb in the japan in 1945 which later to be called as the bombing of the Hiroshima Nagasaki the whole world has recognized the power of the atomic bombs and decided to have a control over the nuclear weapons and introduced various policies like nuclear test ban treaty,nuclear non proliferation treaty etc and also there were many councils who were created to look after the atomic projects.So the nuclear Diplomacy was one of a important factor to avoid a full scale nuclear war which would calamatic as well as consequences even for the future generation like in the case of the bombing of Hiroshima Nagasaki as the people are still suffering from the radiation received from the blast as it caused huge no of diseases to the people as the children are the most who are affected from it like cancer,thyroid were some of the prominent disease there in the place.So the bombing created a huge debate over the possession of the nuclear weapons in the hands of us and for a need of different treaties to control over the nuclear weapons.

Development of Nuclear Weapons

Development of the Nuclear Weapons has started first with the learning of the nature of atom and by discovery of the uranium in the 1789 by Martin klaproth who was a German scientist.
Ionizing radiation was found by Wilhelm Rontgen in 1895, by passing an electric flow through an emptied glass tube and delivering persistent X-beams. Then, at that point, in 1896 Henri Becquerel tracked down that pitchblende (a metal containing radium and uranium) made a visual plate obscure. He proceeded to exhibit that this was because of beta radiation (electrons) and alpha particles (helium cores) being discharged. Villard tracked down a third sort of radiation from pitchblende: gamma beams, which were similarly as X-beams. Then in 1896 Pierre and Marie Curie gave the name 'radioactivity' to this peculiarity, and in 1898 separated polonium and radium from the pitchblende. Radium was subsequently utilized in clinical treatment. In 1898 Samuel Prescott showed that radiation obliterated microbes in food.In 1902 Ernest Rutherford showed that radioactivity, as an unconstrained occasion discharging an alpha or beta molecule from the core, made an alternate component. He proceeded to foster a more full comprehension of molecules and in 1919 he terminated alpha particles from a radium source into nitrogen and observed that atomic revision was happening, with development of oxygen. Niels Bohr was one more researcher who cutting-edge how we might interpret the iota and how electrons were organized around its core through to the 1940s.By 1911 Frederick Soddy found that normally radioactive components had various isotopes (radionuclides), with a similar science. Additionally in 1911, George de Hevesy showed that such radionuclides were important as tracers, since minute sums could promptly be recognized with straightforward instruments. In the late 1932 James Chadwick was the one who found the neutron which was a crucial component for the development of Atomic bombs. Additionally in 1932 Cockcroft and Walton delivered atomic changes by barraging molecules with sped up protons, then, at that point, in 1934 Irene Curie and Frederic Joliot found that whatever changes made counterfeit radionuclides. The following year Enrico Fermi tracked down that a lot more noteworthy assortment of counterfeit radionuclides could be framed when neutrons were utilized rather than protons.Fermi proceeded with his investigations, for the most part delivering heavier components from his objectives, yet in addition, with uranium, a few a lot lighter ones. Toward the finish of 1938 Otto Hahn and Fritz Strassmann in Berlin showed that the new lighter components were barium and others which were about around 50% of the mass of uranium,

accordingly exhibiting that nuclear parting had happened. Lise Meitner and her nephew Otto Frisch, working under Niels Bohr, then made sense of this by recommending that the neutron was caught by the core, causing serious vibration prompting the core parting into two not exactly equivalent parts. They determined the energy discharge from this parting as around 200 million electron volts. Frisch then, at that point, affirmed this figure tentatively in January 1939.

Harnessing of Nuclear Fission

These 1939 advancements started movement in numerous labs. Hahn and Strassmann showed that parting delivered a ton of energy, yet that it likewise delivered extra neutrons which could cause splitting in other uranium cores and perhaps a self-supporting chain response prompting a tremendous arrival of energy. This idea was before long affirmed tentatively by Joliot and his collaborators in Paris, and Leo Szilard working with Fermi in New York. Bohr before long suggested that splitting was significantly more prone to happen in the uranium-235 isotope than in U-238 and that parting would happen more actually with sluggish neutrons than with quick neutrons. The last option point was affirmed by Szilard and Fermi, who proposed utilizing a 'mediator' to dial back the radiated neutrons. Bohr and Wheeler broadened these thoughts into what turned into the traditional examination of the splitting system, and their paper was distributed just a short time before war broke out in 1939.Another significant variable was that U-235 was then known to contain just 0.7% of normal uranium, with the other 99.3% being U-238, with comparative compound properties. Consequently the division of the two to acquire unadulterated U-235 would be troublesome and would require the utilization of their somewhat unique actual properties. This expansion in the extent of the U-235 isotope became known as 'enrichment'.The remaining piece of the parting/nuclear bomb idea was given in 1939 by Francis Perrin who presented the idea of the minimum amount of uranium expected to deliver a self-supporting arrival of energy. His speculations were reached out by Rudolf Peierls at Birmingham College and the subsequent estimations were vital in the advancement of the nuclear bomb. Perrin's gathering in Paris proceeded with their examinations and showed the way that a chain response could be supported in a uranium-water blend (the water being utilized to dial back the neutrons) gave outer neutrons were infused into the framework. They likewise exhibited acquainting neutron-engrossing material with limit the increase of neutrons and hence control the atomic response (which is the reason for the activity of an atomic power station).Peierls had been an understudy of Werner Heisenberg, who from April 1939 directed the German thermal power project under the German Weapons Office. At first this was coordinated towards military applications, and toward the finish of 1939 Heisenberg had determined that atomic splitting chain responses may be conceivable. At the point when dialed back and controlled in a 'uranium machine' (atomic reactor), these chain responses could create energy; when uncontrolled, they would prompt an atomic blast ordinarily more impressive than a customary blast. It was recommended that normal uranium could be utilized in a uranium machine, with weighty water mediator (from Norway), yet apparently scientists knew nothing about deferred neutrons which would empower an atomic reactor to be controlled. Heisenberg noticed that they could utilize unadulterated uranium-235, an uncommon isotope, as an unstable, however he obviously accepted that the minimum amount required was higher than was practical.In the late spring of 1940, Carl Friedrich von Weizsäcker, a more youthful partner and companion of Heisenberg's, drew upon distributions by researchers working in England, Denmark, France, and the USA to reason that in the event that a uranium machine could support a chain response, a portion of the more normal uranium-238 would be changed into 'component 94', presently called plutonium. Like uranium-235, component 94 would be an extraordinarily strong touchy. In 1941, von Weizsäcker ventured to such an extreme as to present a patent application for utilizing a uranium machine to fabricate this new radioactive element.By 1942 the tactical goal was slowed down as unreasonable, requiring a greater number of assets than accessible. The need became building rockets. Nonetheless, the presence of the German Uranverein project gave the fundamental impetus to wartime improvement of the nuclear bomb by England and the USA.

NUCLEAR PHYSICS IN RUSSIA

Russian atomic physical science originates before the Trotskyite Upset by over 10 years. Work on radioactive minerals found in focal Asia started in 1900 and the St Petersburg Institute of Sciences started an enormous scope examination in 1909. The 1917 Upset gave a lift to logical examination and more than 10 material science organizations were laid out in significant Russian towns, especially St Petersburg, in the years which followed. During the 1920s and mid 1930s numerous noticeable Russian physicists worked abroad, energized by the new system at first as the most ideal way to rapidly raise the degree of mastery. These included Kirill Sinelnikov, Pyotr Kapitsa and Vladimir Vernadsky.By the mid 1930s there were a few examination habitats work in atomic material science. Kirill Sinelnikov got back from Cambridge in 1931 to sort out a division at the Ukrainian Foundation of Material science and Innovation (later renamed Kharkov Organization of Physical science and Innovation, KIPT) in Kharkov, which had been set up in 1928. Academician Abram Ioffe shaped one more gathering at the Leningrad Physical science and Specialized Organization (FTI), later becoming free as the Ioffe Foundation, including the youthful Igor Kurchatov. Ioffe was its most memorable chief, through to 1950.By the decade's end, there were cyclotrons introduced at the Radium Establishment and Leningrad FTI (the greatest in Europe). Yet, at this point numerous researchers were starting to succumb to Stalin's cleanses - a portion of the staff of Kharkov Foundation, for example, was captured in 1939. By the by, 1940 saw extraordinary advances being made in the comprehension of atomic splitting including the chance of a chain response. At the encouraging of Kurchatov and his partners, the Foundation of Sciences set up a "Board for the Issue of Uranium" in June 1940 led by Vitaly Khlopin, and an asset was laid out to explore the focal Asian uranium stores. The Radium Foundation had a manufacturing plant in Tartarstan utilized by Khlopin to create Russia's most memorable high-virtue radium. Germany's attack of Russia in 1941 turned a lot of this principal exploration to possible military applications.

Germany Atomic Bomb Project

Prior to the world war II all the nations were trying to develop a nuclear weapon in order to have a great advantage over the other countries and the Nazi Germany was one of them .The spark of creating an atomic bomb was made after the discovery of the nuclear fission by the scientists Otto Hahn and Fritz Strassmann which had given the opportunity to all the nations to create an atomic bomb. The atomic bomb of Germany was led by the physicist Heisenburg and he had been full authority in making of an atomic bomb for Nazi Germany as Nazi Germany had thought of it an great opportunity for them to have a great advantage over the US and other nations. The Nazi Germany atomic bomb project was started on 1939 and was also known as the Uran project but had faced several issues,some of the main challenges that the Nazi Germany faced were:-

- One of the greatest challenges the Nazi Germany faced was of the very shortage of resources as they were already at war and had been very high war expenses which further led to not being able to buy the resources needed for the development of atomic bomb. Also many scientists had run away from Nazi Germany because of the continuous killing of the Jews as this was called to be another main reason for not being able to the development of bomb.
- The Nazi Germany also didn’t have enough fissile material for the development of the atomic bomb. As the Germany in the starting had been using heavy water for the isotopes which is mainly used in the nuclear reactor and it was very difficult to obtain the heavy water for reactor.
- Another important reason for the failure of the Nazi bomb is allied sabotaging where other nations try their best to not let the nation gathering resources for the nuclear weapons or by attacking of the nuclear reactors where the scientists are working for the development of the atomic bomb.

- There were many disagreements between the scientist in the making of the atomic bomb like some scientists have idea about creating the atomic bomb made of uranium based while others had called for the creation of the bomb using the plutonium based bomb. This was one of the great issues which further led to the delay of making of an atomic bomb and for the other nations to be getting ahead of them.

Even after all this challenges Heisenberg with his co scientists had achieved the first chain reaction which was the first step towards the creation of an atomic bomb however in the later 1942 germans were fallen behind because of the continuous sabotaging of the nazi bomb and ultimately led to the german atomic bomb to be fallen off very behind other nations and at the end of the world war germans were not being able to make atomic bomb for their future superiority against other nation.

Sabotaging of the Nazi Bomb

There were many cases for the Sabotaging of the nazi bomb some of the main cases to show that are:-

- One of the biggest cases of the sabotaging was of the destruction of the heavy water plant in vemork which is in Norway in the late 1943 as the heavy water was a necessity for the nuclear reactors to work and allied nations were afraid that the german nuclear development would move further which led to the destruction of the heavy water plant by a group norweigan with further getting the help from the British Secret Operations people who wanted to prevent germans from developing a weapon of mass destruction

- Another important case for the sabotaging was of the French fighter who had infiltrated the german lab in Alsace-lorraine and had destroyed one of the main components that were needed for the building of the atomic bomb which paved the way for their slowing down as well preventing from the making of the nuclear development.

- Allied intelligence from the different nations had sent their spy to look onto the work of the german atomic bomb and were successful at a high rate and had got valuable information on the nuclear bombs of the Germany.

These were some of the main causes to show how desperate were the other nations tried to stop the nuclear development of the Germany.

Scientists who worked for the Development of Atomic Bomb

- **ENRICO FERMI**

Enrico Fermi was one of the most important scientists and was the founder of the world's first nuclear reactor (Chicago Pile-1). Enrico Fermi was one of the most important scientists of the 20th century, known for his bringing up for new ideas to the fields of nuclear and flyspeck drugs. He was Born in Rome, Italy in 1901, Fermi was a intelligent who displayed an early interest in wisdom and mathematics. He went on to study drugs at the University of Pisa, where he earned his undergraduate degree in 1922 at the university of rome and his doctorate in the university of pisa on 1924. Fermi began his career as a professor of theoretical drugs at the University of Rome, where he worked on a wide range of motifs, including amount mechanics, statistical mechanics, and nuclear drugs. In 1933, Fermi was awarded the Nobel Prize in Physics for his work on the proposition of beta decay. This was a significant achievement, as Fermi was only 32 times old at the time, making him the youthful- ever philanthropist of the Nobel Prize in Physics. During World War II, Fermi was signed by the US government to work on the Manhattan Project, a top-secret trouble to develop an infinitesimal lemon. Fermi played a crucial part in this design, leading a platoon of scientists at the University of Chicago who erected the first nuclear reactor. This reactor, known as the Chicago Pile- 1, went critical on December 2, 1942, demonstrating the possibility of a tone-sustaining nuclear chain response. Fermi's work on the Manhattan Project was necessary in the development of nuclear power, which has had a profound impact on the ultramodern world. The use of nuclear power has led to significant advances in drug, assiduity, and energy product. still, it has also raised enterprises about the safety and security of nuclear accoutrements , as well as the eventuality for nuclear munitions proliferation. After the war, Fermi continued his exploration at the University of Chicago, where he made important benefactions to the study of high- energy drugs and flyspeck drugs. He was a colonist in the field of neutrino drugs, studying the fugitive patches that are produced in nuclear responses and emitted by the sun. Fermi's work on neutrinos helped to establish the field of flyspeck astrophysics, which seeks to understand the parcels and geste of subatomic patches in astronomical settings. In addition to his scientific achievements, Fermi was also known for his tutoring and mentorship. He trained several generations of physicists who went on to make significant benefactions to the field, and his influence can still be felt moment. Fermi was known for his rigorous approach to drugs, emphasizing the significance of experimental verification and precise dimension. His heritage lives on in the numerous scientists he trained and inspired, as well as in the ongoing exploration that builds on his groundbreaking work. In conclusion, Enrico Fermi was a remarkable scientist who made significant benefactions to the fields of nuclear and flyspeck drugs. His work on the first nuclear reactor and the development of nuclear power had a profound impact on the ultramodern world, while his exploration on high- energy drugs and flyspeck astrophysics laid the foundation for numerous important discoveries in these fields. Fermi's heritage as a schoolteacher and tutor also continues to inspire new generations of physicists. His work serves as a memorial of the power of scientific inquiry and the significance of rigorous trial and dimension.

- **Klaus Fuchs**

Klaus Fuchs is another one of the important German scientist who had a great role in the creating of the first nuclear weapon. He was a german physicst who was also called to be an atomic spy who was giving information about the Manhatten project to the Soviet Union.For this he was sent to the prison for almost nine years in united kingdom and then he was moved out to east Germany to spend the rest of his life as a physicst and also to be a leader of the scientists in the Germany .He was a son of pastor Fuchs who used to work in the university of leipzig where he was a professor of theology and he was also given to attend in the same university. He had involved in the student poltics party that is SPD(Social democratic party of Germany)and was later removed in 1932 and had joined the communist party of Germany And had been been hiding later on after the incident of Reichstag fire in 1933.

- **J.Robert Oppenheimer**

J.Robert Oppenheimer was a very important person who used to work for the nuclear development and was also the person who used to debate over the control of the use of nuclear weapons.He was born in new york in 1904 and had attended his schooling in Ethinic cultural school and is an undergraduate from Harvard university in chemistry as well as physics in 1925.After completing his undergraduate degree he moved to the Europe where he got enrolled in the University at Cambridge where he got an interest in the theoretical physics and had worked under a very famous physicist of Cambridge university that is Paul Dirac and at university of Gottingen he had studied under another great physicst max born and received his doctorate in physics in 1927. After getting his undergraduate from Cambridge and doctorate from Gottingen he had returned to united states and had started teaching at university of California where he was appointed as a professor and was also given the freedom to research on the properties of the Atomic Nuclei.

In the later period of 1942 he was recruited to lead the manhattan project which was one of the top secret project to develop a atomic bomb before Nazi Germany will make it.He was the one who appointed various scientists to work under the manhattan project some of them were Enrico Fermi,Richard Feynman and Nicels Bohr. Oppenheimer was the one who look after the Project and Development.Oppenheimer was responsible for coordinating the staff members as well as the the scientists. In July 1945 Manhattan Project has attained his goal as well as the Oppenheimer as the first atomic bomb blast has happened on NEW MEXICO,Alamogordo as he says this moments to be very much thrilling as well as exciting. He had witnessed the immense power of the atomic bombs.and after the experiment he had worked to make up a international nuclear weapons control and had warned everyone of the destructive power of the nuclear weapons.

Science of the Bomb

The Making of the atomic bomb was one of the greatest ever achievement for the industry of science and engineering. The science behind the forming of the atomic bomb was the principles of nuclear fission which had been discovered before the world war I. the science of the atomic bomb was mainly developed by a group of scientists led by the Oppenheimer who was the leader and the main head for the development of the Manhattan project .Main scientists like Enrico Fermi,Leo Szilard etc. The materials used in the development of the atomic bomb were the uranium-235 and plutonium-239 both of which were considered to be Fissionable Isotopes As the fissionable Isotopes are those which can be split into smaller fragements and which will further release an great amount of energy as this energy is the thing the manhattan project tried to obtain as these enormous energy would create a chain reaction which would provide more than enough energy to create an huge explosion as this explosion would be enough to eradicate a whole city.

Another important process for the development of atomic energy was the fissile material which was also a great challenge for the developers or the scientists of the manhattan project .Uranium235 can be found naturally in the uranium ore but at a very small amount and to obtain the uranium 235 scientists had to develop a way to separate it from the abundant uranium-238.This separation is known as uranium enrichment and was very difficult and huge time consuming. There were some main methods used by the scientists for uranium enrichment like electromagnetic method and diffusion of gasesous. Plutonium 239 is another main component and is not found through nature and this method is also known as nuclear transmutation. In this uranium 238 with neutrons would convert it into uranium239.this method should be done very carefully and will require a huge reactor which is built in Hanford Washington. Once everything is collected the scientists had to create a way to develop a chain reaction. This was fissile material into small pieces when the critical masses into chain reaction the bomb would explode. The design of the bomb had many number of safety measures taken in order for the bomb to explode at the exact time that has done

to made and exactly at the place that the bomb has decided to explode.As the time mechanism was very important for the bomb and it will help in dropping the bomb and exploding it at the right time. The development of nuclear weapons took a lot of efforts and each of the main things like uranium,plutoniun took a lot of researchers and development through a variety of trial and errors. After many efforts the first atomic bomb was tested on july16,1945 in Alamgordo,New Mexico which is to be called as Trinity was one of a great success and this further led to the use of nuclear weapons in the warfare.

Manhattan Project

The Manhattan project was one of the most important research development program which was undertaken by the US government and was authorized by the president Franklin D Roosevelt and was the first nuclear weapons that produced during the world war II which also ended the world war II with the surrender of Japan. The manhattan project is one of the most top secret program and was not been told to peoples who worked under it and were known only to the scientists with atmost priority only even the president came to know about it only after the project had been completed.the Manhattan project was formed mainly due to the fear that nazi germany would make make an atomic bomb before the united states. There were many prominent scientists including Albert Einstein who had warned the US government of the potential dangers that will cause with the development of the nuclear weapons. The project of the manhattan was also named after the manhattan engineer district in US. The Main reason for the US to work for the manhattan project was to have a huge great advantage against their enemies(Nazi Germany) by having a nuclear weapon.
J.Robert Oppenheimer was the one who was tasked to find scientists to work under the Manhattan project and also for US to have a strategic advantage over the Nazi Germany in buiding of a nuclear weapon in the war. The Manhattan Project atomic bomb has mainly aimed in 3 main things that are:-

- Uranium 235
- Plutonium
- Weapon design

These 3 were the main things that the scientists used to work on in order to create an Atomic bomb as the uranium 235 was needed for the creation of the a chain reaction and to have a creation of an explosion, the plutonium was needed for to create an another type of an bomb known as implosion bomb and the weapon design is one of the main things to create the atomic bombs and also to have a proper time period for a bomb to when explode and at what place.

The project had faced many problems while in the construction of the atomic bomb as it was difficult for the scientists to production process of the uranium and had difficulty in the testing process of the bomb as well. After overcoming all these things the us were able to conduct their first nuclear test which is later to be known as the trinity test that had happened on July 16,1945 in New Mexico where they showed the world of the destructive power of the Atomic bombs And the later incident of the bombing of Hiroshima Nagaski which killed of an almost of 100,000 people which helped in US to be recognized as an superpower nation as well as a nation who have the power to create an peacefully time as well as to create a destructive time for the cities. So the Manhattan project was a success and us continue to develop their technology even more and more for us to be nation not to be trample with.

Women of the Manhattan Project

The Manhattan project was considered to be an one of the most important scientific and technological development of the 20th century and while the main working members were men in the manhattan project there were many prominent women who used to be play a very important role in the developing of the manhattan project.one of the main or the important women in the manhattan project was Chien-Shiung Wu, a great physicst and an mathematician.

- **Chien-Shiung wu** was a great physicist who was part Chinese and part American who had played a very great role in the Manhattan project as well as in the the field of nuclear physics and played a great role in the world war II. She was born on the city of Liuhe which is under the china Jiangsu province. Her parents were educators and had created a love for education by them to her in at the very early age. Wu had completed her undergraduate at the National Central University which is located in Nanking where her main focus of study was mathematics. After doing her undergraduate she had moved to United States to pursue her post graduation in the university of Berkeley which is located in California under the supervision of a renowed physicist Ernest.O.Lawrence who as later given the award of nobel prize in physics for her important work in the cyclotron and after getting her phd she used to work on multiple institutions in her career and during the world war II she worked on the manhattan project where she helped the scientists in making a process to separate the uranium Isotopes. One of the main achievements of her on the physics was the priniciple of the conservation of parity and was one of the greatest discoveries which further helped in the getting of a greater understanding of the physics.As this discovery describes how the particles were interacting with eachother and is to be the fundamental law of the physics.In the later period of 1950s a group of scientists led by tsung -dao lee and chen Ning Yang had found out that the discovery of the parity conservation was not always true.Wu had conducted an experiment and had understanded how the particles had interacted with eachother and developed a greater understanding of physics.

- **Leona Woods Marshall Libby** was another great physicst who used to work under the Manhattan project.She was origin of American and was one of the great physicist during world war II. She was one of the youngest scientist who was there with the first controlled chain reaction and had played a crutial role in the development of the first atomic bomb. she was born on August 9,1919 and had completed her schooling in Township High School where she performed excellently in both science and maths.After her schooling in 1936, she had gone to get a bachelor degree from university of Chicago in physics in 1940 and later to pursue post graduate at the same institution and was under the supervision of a great physicst who was very famous of that time that is Enrico Fermi . In the late 1942 she was invited to become the part of the manhattan project and had given the work to developing of the atomic bomb.She was to be the only female physicist who used to work under the Chicago university lab and her objective was to calculate the required no of uranium needed to make a chain reaction.On the December 2,1942 she was there to see the first controlled chain reaction in the university of Chicago and was given crucial role to monitor whether the reactor and their instruments are working properly.After the success of the first chain reaction the manhattan project was moved to los almos which is located in the new Mexico and she was given the task to develop the mechanism of the detonation time of the atomic bomb and also to calculate the efficiency of the bomb.

- **Irene Joliot Curie** is another one of a great scientist who had a significant role in the the field of physics and chemistry who was exceled in both the fields of chemistry and physics. She alomg with her husband Fedric Joliot Curie were the peoples who had discovered the Artificial Radioactivity. Her mother was one of a great physicist who got nobel prizes in 2 different fields. She was an part of French resistance and had worked on the development of the nuclear weapons. she with her husband had tried to create a bomb with the use of plutonium and had failed because of the very shortage of the uranium which led to not being able to made of an atomic bomb and her work had helped in the later period in creation of an atomic bomb in the Manhattan project.

- **Katherine Way** is another one of the great women scientist who used to work under the manhattan project. In the late of 1943 she was recruited by the people working under the manhattan project from the university of Chicago and had played a keen role in the separation of the isotopes and her main course of study was on the analytical development. she with her colleagues had dound a way to remove the abundant uranium 238 from the small uranium 235 which is one of the crucial things which helped in the development of the atomic bomb as her method was much more easier and less risky.

Bombing of Hiroshima Nagasaki

The bombing of Hiroshima and Nagasaki was considered to be one of the history most catastrophic event in the history of the world. The Main reason for the war between the United States and Japanese was because of **the Pearl Harbor Incident**.

PEARL HARBOR

On the early morning of 1941 december the imperial navy who were aggressively expanding their territory had invaded the pearl harbor as the pursue Japanese had 350 soliders, torpedo planes,fighter planes were sent to the pearl harbor to attack.the Japanese were successful in their attack and were able to sink many American ships and around1100 were wounded and more than 2,400 were killed as this attack was a surprise to the US military and navy forces and in response to it United States had declared war against the Japanese and their was a huge resentment against the Japanese people by the united states people and is to be the main reason for the bombing of Hiroshima Nagasaki

Bombing of Hiroshima had happened on August 6,1945 and the bomb which was thrown is called as the "Little Boy" As the explosion of this bomb had instantly killed almost 70,000 people inside the city and many more people had died due to the radiation from the atomic bomb and after 3 days another bomb named "Fat Man" was dropped on the Nagasaki and had killed an estimate of 40,000 peoples and the bomb has caused severe radiation in that area which affected the future generation also.

AfterEffect

The city of both Hiroshima and nagaski was in full of ruins completely destroyed by the atom bomb. This bombing has not only caused radiation but also emotional trauma to the survivours and this crucial event had later on led to the introduction of the various treaties to avoid a full scale nuclear war and also to maintain peace among the nations and as well as to let every nation to know of their devastating or destructive powers of the atomic bombs and also led to the end of the world war II.

Some of the main treaties after witnessing the destructive powers of the nuclear powers are:-

- **Nuclear Non Proliferation Treaty**

It came into existence on the late 1970s and its main to prevent the spread of nuclear energy for destructive purposes rather to use the nuclear energy for to maintain cooperation among the nations and also to maintain peace and order.

- **Strategic Arms Reduction Treaty**

In this treaty both the us and the soviet union had aimed to reduce the development and use of the nuclear arsenal and their treaty was first signed on 1991 and later to be again sign in 2010.

CONCLUSION

Nuclear development was one of the significant things that Transformed the world into a Nuclear Age and this nuclear development has further led to the the development of the nuclear diplomacy to have a much more carefull and controlled use of the nuclear weapons and to avoid a bomb blast like the Hiroshima Nagaskai which had a great effects on the peoples lived there for a long time and the global treaties were made to ensure to not to have a full scale nuclear war between the nations. So in conclusion development of nuclear weapons was great achievement for the mankind but also a great threat to the mankind if not used responsibly.

BIBLIOGRAPHY

- United States Library of Congress https://www.ushistory.org/us/index.asp
- Manhattan Project: The Birth of an Atomic Bomb in the words by Cynthia C.Kelly
- The Decision to Use the Atomic Bomb by Gar Alperovitz
- Their day in the sun: Women of the Manhattan project by Ruth howes and Caroline Herzenberg