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# Comparison of nuclear reactors regarding safety

**Frederico Emidio Wu, Thadeu das Neves Conti**

Instituto de Pesquisas Energéticas e Nucleares- IPEN

frederico.emidio.wu@gmail.com

## Objective

This work's aim is, through a bibliographic research, to assess the safety of different types of nuclear reactors, especially those from Generations II and IV, in order to compare them regarding this aspect.

## Materials and Methods

To compare the safety of nuclear reactors, it is necessary to understand the philosophy behind the measures adopted and methods to evaluate them. These are researched along with the relevant information about each reactor type. The study uses articles and books, being necessary a computer with access to the internet and libraries. The IPEN guarantees the access, with financial support from FAPESP.

## Results

The research on the reactor safety philosophy showed that it follows the principle of defence-in-depth, implementing safety systems in levels, redundant and independently, with regular upgrades, taking into account the advancements with new reactors[1][2]. The operational history of American reactors shows that the most common events to occur in BWRs and PWRs are loss of offsite power, feeding water or heatsink[3]. One value used to characterize the safety of a nuclear reactor is the Core Damage Frequency, or CDF. Today, most of the Generation II BWRs and PWRs in the USA have a CDF on the order of $5x10^{-5}$ per operating year, while the CDF of more advanced reactors are about 10 times lower[4]. The Fukushima accident led to revisions in the way regulators evaluate reactor safety[5]. The Generation IV concepts offer potential advancements in energy efficiency as well as safety and sustainability[6].

## Conclusions

In light of the importance of human factors and wrong assumptions about certain events, like flooding, revealed by Fukushima, the Generation IV concepts become appealing with the use of passive safety systems and even the possibility of inherent safety, in addition to difficult nuclear proliferation. Despite that, the extreme operating conditions present challenges to the practicality of these concepts.

## References

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