

## Patenting the HIF Power System Using the SPRFD

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This paper discusses the rationale for patenting inventions that enable the HIF power plant and the status of the prosecution of these patents. Our rationale for starting a business to pursue HIF power was its “suspended animation” despite being held since its 1976 debut to face “no showstoppers” and considered to be “the conservative approach to power production.” In turn, the rationale for patenting the unique features in our HIF approach is that intellectual property (IP) is essential to attract investors to a business endeavor that could readily be taken over by large competitors. In contrast to other fusion startup companies using such claims as compactness or a-neutronic reactions to attract investors, FPC uses the technology given the highest expectations worldwide for success: ICF driven by beams of high-energy heavy ions. Fully conscious that our present HIF concept will undergo substantial evolution during the project to bring fusion to the market, not unlike how Project Apollo involved much evolution of rocketry and other essential technologies, FPC’s vision combines leadership from industry and finance (a major departure from Apollo’s approach) to overcome lethargy in the various communities—governments, industry and finance, environmental, peace and security — and even in the science and technical communities whose expectations have sunk low resulting from NIF’s failure to ignite a pellet and ITER’s failure of promise.

The impetus for founding Fusion Power Corporation in 2009 was completion of the concept for an RF accelerator driver (Single Pass RF Driver or SPRFD) that avoided the uncertainties of systems involving storage rings. Besides avoiding the “black cloud” problem of storage rings, omission of storage rings opened a path to the small spots needed for fast ignition by eliminating the large increase in transverse beam emittance accompanying multi-turn injection. Two main principles drove the SPRFD: 1) seeking a more straightforward way than explored 1994-96 by HIDIF to exploit the major and basic advantages of multiple heavy ion species, and 2) “give HIF its head” by stressing workability and basic energy economics (independent variables) rather than being deterred by the dependent variables of large size and capital requirements.

Indeed, our system is large and will take much capital—as do the fossil fuel complexes that the world needs to obsolete.

The patenting process has mirrored the present condition of fusion development worldwide. The US Patent and Trademark Office (USPTO) first rejected the application on the grounds that decades of work by highly skilled researchers using many \$billions from many governments worldwide had concluded that fusion was far in the future, and quoted a report from the US HIF program at LBNL that had concluded that HIF might never work. Resubmittal included “utilities” for a neutron source as well as for power, and adroit persistence by our patent counsel, finally resulted in a US patent covering the driver aspects [1]. We expect the prosecution for the pellet and chamber innovations to continue for up to another two years in the US.

Russia granted a patent in 2013 on the accelerator parts of the patent application. Russia also insisted, like the US and Europe, that the accelerator and fusion chamber parts of the application are separate inventions. The last round of questions from Europe was completed in March 2016, and a patent on the chamber aspects could be granted this year. Prosecution in China stalled on objections such as whether “microbunch” is an acceptable term of the art, and we abandoned the effort after 6 years. After 7 years, India finally questioned whether the application conflicts with the Atomic Energy Act, and we dropped that effort.

### References

- [1] Patent number US 20120328066 A1