Radiation for Dummys
References

[1] S.P. George, R. Gaza, D. Matthiä, D. Laramore, J. Lehti, T. Campbell-Ricketts, M. Kroupa, N. Stoffle, K. Marsalek, B. Przybyla, M. Abdelmelek, J. Aeckerlein, A.A. Bahadori, J. Barzilla, M. Dieckmann, M. Ecord, R. Egeland, T. Eronen, D. Fry, B.H. Jones, C.E. Hellweg, J. Houri, R. Hirsh, M. Hirvonen, S. Hovland, H. Hussein, A.S. Johnson, M. Kasemann, K. Lee, M. Leitgab, C. McLeod, O. Milstein, L. Pinsky, P. Quinn, E. Riihonen, M. Rohde, S. Rozhdestvenskyy, J. Saari, A. Schram, U. Straube, D. Turecek, P. Virtanen, G. Waterman, S. Wheeler, K. Whitman, M. Wirtz, M. Vandewalle, C. Zeitlin, E. Semones, T. Berger (2024) *"Space radiation measurements during the Artemis I lunar mission",* Nature, Vol. 634, pp48-52 https://www.nature.com/articles/s41586-024-07927-7

[2] K. Mars (2022) *"Artemis I Space Radiation Research to Help Moon, Mars Explorers"*, NASA, https://www.nasa.gov/general/artemis-i-space-radiation-research-to-help-moon-mars-explorers/

[3] N.N. Stoffle [a], T. Campbell-Ricketts, A. Castro, R. Gaza, C. Zeitlin, S. George, M. Abdelmelek, A. Schram (2023) *"HERA: A Timepix-based radiation detection system for Exploration-class space missions"*, Life Sciences in Space Research, Vol. 39, pp59-66, https://www.sciencedirect.com/science/article/pii/S2214552423000226

[4] D. Laramore (2023) *"Artemis 1 Radiation Analysis, Modeling, and Dose Assessment",* Twenty-sixth WRMISS Workshop, Scientific Session 10, https://wrmiss.org/workshops/twentysixth/Laramore.pdf

[5] F.A. Cucinotta, M-H.Y. Kim, L.J. Chappell, J.L. Huff (2013) *"How Safe Is Safe Enough? Radiation Risk for a Human Mission to Mars",* Plos One, Vol. 8, No. 10, e74988, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3797711/

[6] T. Phillips (2005) *"Sickening Solar Flares",* Science@NASA (Archived), https://web.archive.org/web/20050129063750/https://science.nasa.gov/headlines/y2005/27jan_solarflares.htm

[7] H.O. Funsten, R.M. Skoug, A.A. Guthrie, E.A. MacDonald, J.R. Baldonado, R.W. Harper, K.C. Henderson, K.H. Kihara, J.E. Lake, B.A. Larsen, A.D. Puckett, V.J. Vigil, R.H. Friedel, M.G. Henderson, J.T. Niehof, G.D. Reeves, M.F. Thomsen, J.J. Hanley, D.E. George, J.-M. Jahn, S. Cortinas, A. De Los Santos, G. Dunn, E. Edlund, M. Ferris, M. Freeman, M. Maple, C. Nunez, T. Taylor, W. Toczynski, C. Urdiales, H.E. Spence, J.A. Cravens, L.L. Suther, J. Chen (2013) "*Helium, Oxygen, Proton, and Electron (HOPE) Mass Spectrometer for the Radiation Belt Storm Probes Mission*", Space Science Reviews, Vol. 179, pp423-484, https://scholars.unh.edu/physics_facpub/163/

[8] G.D. Reeves (2014), Personal Communication.

[9] J. White (2016) *"MoonFaker: Radiation Reloaded",* YouTube, https://www.youtube.com/watch?v=dzfL0QmnkuM

[10] J.Z. Liang, T. Li, R.W. Schutle, T.J. Satogata, D.C Williams, F.H.-W. Sadrozinski (2008) "Proton Computed Tomography", [In: Cancer Imaging: Instrumentation and Applications, Vol. 2. Edited by M.A. Hayat], Elsebier Academic Press, pp3-16

[11] V.J. Linnenbom (1962) *"Range-Energy Relations For Protons And Electrons in Al, Si, and SiO_2"*, US Navy Research Laboratory, NRF Report 5828, https://apps.dtic.mil/sti/tr/pdf/AD0285855.pdf and J.H. Smith (1947) *"Theoretical Range-Energy Values for Protons in Air and Aluminum"*, Physical Review, Vol. 71, No. 1, pp32-33, https://journals.aps.org/pr/abstract/10.1103/PhysRev.71.32

[12] J.W. Keller "Problems in Radiation Shielding of Space Vehicles", https://ntrs.nasa.gov/citations/19630006111
&
https://ieeexplore.ieee.org/document/6432974

[13] C. Poivey (2002) *"Radiation Hardness Assurance for Space Systems", NASA*, pp7 https://ntrs.nasa.gov/api/citations/20020080842/downloads/20020080842.pdf

[14] R.S. Johnson, L.F. Dietlein, C.A. Berry, J.F. Parker, Jr. (1975) *"Biomedical Results of Apollo",* NASA, NASA-SP-368, https://ntrs.nasa.gov/citations/19760005580

[15] NASA Mission Evaluation Team (1971) "*Apollo 14 Mission Report",* NASA-TM-X-74240, https://www.nasa.gov/history/alsj/a14/a14mr.html

[16] S.P. George (2023) *"Radiation Measurements with the Timepix based HERA Instrument on Artemis I and Biosentinel",* IWORID 2023, https://ntrs.nasa.gov/api/citations/20230008985/downloads/Artemis%20I%20presentation.pdf

[17] J.E. Barzilla, D. Laramore, A.S. Johnson, P. Quinn, N. Stoffle, S. Hu, K. Whitman, R. Egeland, E. Semones, M.L. Mays, Y. Collado-Vega (2024) *"Radiation Operations: Lessons Learned from Artemis-I",* 53rd International Conference on Environmental Systems, ICES-2024-230, https://ttu-ir.tdl.org/server/api/core/bitstreams/f0a4b6ac-4826-4e97-bc73-c2f6846ac79f/content

[18] J.A. Van Allen (1959) Radiation Belts around The Earth, Scientific American, Vol. 200, No. 3, pp39-47, https://www.scientificamerican.com/article/radiation-belts-around-the-earth/

[19] T.F. Dawn, J.P. Gutkowski, A.L. Batcha, S.M. Pedrotty (2018) *"Trajectory Design Considerations for Exploration Mission 1",* NASA, JSC-E-DAA-TN50136, pp5 https://ntrs.nasa.gov/citations/20180001259

[20] W. Sun, X. Jia, T. Xie, F. Xu, and Q. Liu (2013) "*Construction of boundary-surface-based Chinese female astronaut computational phantom and proton dose estimation*", Journal of Radiation Research, Vol. 54, pp383–397, https://www.researchgate.net/publication/233330482_Construction_of_boundary-surface-based_Chinese_female_astronaut_computational_phantom_and_proton_dose_estimation

[**21**] M. Edwards (1987) *"Chernobyl – One Year After",* National Geographic, Vol 171 No 5, pp640

[22] John Mauldin (1992) "*Prospects For Interstellar Travel*", *AAS Science and Technology Series*, Vol. 80, pp225

[23] M. Edwards (1987) *"Chernobyl – One Year After",* National Geographic, Vol 171 No 5, pp640

[24] L. Bergreen (2000) *"The Quest For Mars: The NASA Scientists And Their Search For Life Beyond Earth",* Harper Collins

[25] J. Windley *"ENVIRONMENT: Here Comes The Sun"* Clavius Moon Base, https://clavius.org/envsun.html

[26] J. Rask, W. Vercoutere, B.J. Navarro, A. Krause (2008) *"Space Faring: The Radiation Challenge. An Interdisciplinary Guide to Radiation and Spaceflight"*, NASA, EP–2008–08–116–MSFC, pp19 https://www.nasa.gov/wp-content/uploads/2017/04/radiationchallenge.pdf?emrc=ba69fb

[27] E. Blakely (2008) "Space Radiation and Cataracts", UCTV | YouTube, https://www.youtube.com/watch?v=6aWUa5l_WNs&t=3240s

[28] Astronomy Staff (2007) "Earth's Protective Magnetic Field" Astronomy, https://www.astronomy.com/science/earths-protective-magnetic-field/

[29] https://www.spaceweather.com/archive.php?view=1&day=22&month=11&year=2022

[30] https://tech.hindustantimes.com/tech/news/fastmoving-solar-winds-break-magnetic-field-over-earth-dangerous-solar-storms-to-follow-71670484004002.html

[31] https://www.spaceweather.com/archive.php?view=1&day=07&month=12&year=2022

[32] https://tech.hindustantimes.com/tech/news/terrifying-solar-storm-strikes-earth-carried-by-solar-winds-moving-at-500-kms-71670561581580.html

[33] https://www.youtube.com/watch?v=_IWSaicWuVA

[34] https://www.aulis.com/j_white_col5.htm

[35] D. Jones, B.W. Sibrel, C. Duke (2025) "*NASA Apollo Astronaut Finally Faces Off Against #1 Moon Landing Skeptic*," Danny Jones Podcast, https://www.youtube.com/watch?v=kMn6sI4X66s 2:58:22

[36] R.A. Mewaldt, C.M.S. Cohen, G.M. Mason, T.T. von Rosenvinge, R.A. Leske, J.G. Luhmann, D. Odstrcil, A. Vourlidas (2013) "Solar Energetic Particles and their Variability from the Sun and Beyond," AIP Conference Proceedings, Vol. 1539, pp116-121, https://www.academia.edu/86707338/Solar_Energetic_Particles_and_their_Variability_from_the_Sun_and_Beyond

[37] J. Amos (2012) "Mars for the average person," BBC, https://www.bbc.com/news/health-17439490 (14min into interview)

[38] Mathew Travis (2016) *"Elon Musk Unveils SpaceX's Mars Interplanetary Transport System Arcihtecture At IAC 2016",* YouTube, https://www.youtube.com/watch?v=SPblvFBnEDk

[39] https://www.youtube.com/watch?v=NFQhsm9KrP8

[40] https://www.youtube.com/watch?v=QMXnAmWvE28

[41] https://www.youtube.com/watch?v=tdUX3ypDVwI

[42] https://www.youtube.com/watch?v=5cPMS6cT0Ig

[43] E. Sheriff (2025) *"Ex-Astronaut Issues Dire Warning for NASA's Artemis II Mission"*, Ellie In Space, YouTube, https://www.youtube.com/watch?v=oISaScoQ92I & https://www.nytimes.com/2012/02/04/us/roger-boisjoly-73-dies-warned-of-shuttle-danger.html

[44] Kathryn Hambleton (2025) *"NASA's First Flight With Crew Important Step on Long-term Return to the Moon, Missions to Mars"*, NASA, https://www.nasa.gov/missions/artemis/nasas-first-flight-with-crew-important-step-on-long-term-return-to-the-moon-missions-to-mars/ & https://www.nasa.gov/image-article/nasas-sls-mega-rocket-what-is-the-icps/

[45] E.E. Kovalev (1983) "Radiation protection during spaceflight", Aviation Space & Environmental Medicine, Vol. 54, No. 12 Pt 2, ppS16-23, https://pubmed.ncbi.nlm.nih.gov/6318715/

[46] A. Buzzoni, J. Guichard, G. Altavilla, A. Figer, E.M. Alessi, G. Tommei (2019) *"Toward a Physical Characterization of the Soviet/Russian Constellation of Molniya Satellites",* First International Orbital Debris Conference, https://ui.adsabs.harvard.edu/abs/2019LPICo2109.6067B

[47] S. Krishna (2025) *"The farthest journey in human history is about to begin"*, National Geographic, https://www.nationalgeographic.com/science/article/artemis-2-moon-mission-astronauts

[48] J. Wattles NASA is about to send people to the moon—in a spacecraft not everyone thinks is safe to fly. CNN Science 23 Jan 2026 https://edition.cnn.com/2026/01/23/science/artemis-2-orion-capsule-heat-shield