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Black Hole Formation in the Lower Mass Gap through Mergers and Accretion in AGN Disks YANG YANG, University of Florida — The heaviest neutron stars and lightest black holes expected to be produced by stellar evolution leave the mass-range $2.2\,M_\odot m5\,M_\odot$ largely unpopulated. Objects found in this so-called *lower mass gap* likely originate from a distinct astrophysical process. Such an object, with mass $2.6\,M_\odot$ was recently detected in the binary merger GW190814 through gravitational waves by LIGO/Virgo. Here we show that black holes in the mass gap are naturally assembled through mergers and accretion in AGN disks, and can subsequently participate in additional mergers. We compute the properties of AGN-assisted mergers involving neutron stars and black holes, accounting for accretion. We find that mergers in which one of the objects is in the lower mass gap represent up to 4% of AGN-assisted mergers detectable by LIGO/Virgo. The lighter object of GW190814, with mass $2.6\,M_\odot$, could have grown in an AGN disk through accretion. We find that the unexpectedly high total mass of $3.4\,M_\odot$ observed in the neutron star merger GW190425 may also be due to accretion in an AGN disk.

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