

# Multi-level Encoding and Decoding in a Wavelength-Multiplexed Photonic Tensor Processor

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A direct value mapping is implemented to translate digital numbers to analog values, and calibration and validation stages are also required. The calibration stage first starts with encoding the inputs to the MRR as the amplitude of the input optical channel modulated by an attenuator. Here, a direct *input mapping* encodes digital input values as the attenuation applied on the input optical channel. Next, we perform a current sweep for one MRR at a time using a constant laser power, and a linear response in optical output power,  $P_{DROP}$  -  $P_{THRU}$ , is chosen as the *MRR profile*, as shown in Fig. 2(a). Now we need to define the *zero point*, or the *reflection point*, of the MRR, which can be interpreted as the specific current value