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ABSTRACT OF THE INVENTION

The present invention comprises a system for condensing and collecting electromagnetic radiation having a primary reflector disposed on one side of an electromagnetic radiation source and a target disposed on the opposite side of the source. The primary reflector includes a concave reflecting surface portion, which preferably forms the entire surface of the reflector. The concave surface portion of the primary reflector, which is preferably of a substantially toroidal shape, defines an optical axis and a primary center of curvature disposed along the optical axis. The source of electromagnetic radiation is located approximately on the optical axis but axially offset a first distance from the center of curvature in a direction toward the concave surface portion. The target, such as a single core fiber optic or a fiber optic bundle, is located approximately on the optical axis but axially offset a second distance from the center of curvature in a direction away from the concave surface portion for acquiring a substantially focused image of the source reflected by the concave surface portion. With this configuration, the first and second distances are approximately related by the equation $(1 - z_s/r_1) \times (1 - z_i/r_1) = 1$ where z_s is the first distance, z_i is the second distance and r_1 is the primary radius of curvature of the toroidal reflecting surface portion of the primary reflector when a toroidal reflector is used for partial compensation of aberrations. In an alternate embodiment, a secondary reflector may further be added behind the source on the side opposite the primary reflector to enhance further light collection. According to a second alternate embodiment, the system may also comprise a housing

having sides with inner surfaces forming the primary reflector and the secondary reflector.

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